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ABSTRACT

This report describes a higher education enrollment projection model developed for the state of Washington. The model operates on a student flow concept quantifying students through the flows of entrances, retention, transfers, and exits. The model is based on the assumption that the manner in which students now move through the State's higher education system will be similar during the projection period. Projections were produced for the State's entire higher education system, presently including 22 community college districts, and 18 universities and colleges. An expansion figure has been programmed into the model so that potentially 25 community colleges and 20 universities and colleges can be handled. The model operates by annual iterations, projecting students according to the number of students within each student flow. In addition, the 4-year institutions are projected by class for the undergraduate students. Community college projections contain source of students by student flow category with no class distinction. The model can address "what if" contingency questions, and is programmed in FORTRAN IV for the IBM 360 with core requirements of 110K. (Author/AF)

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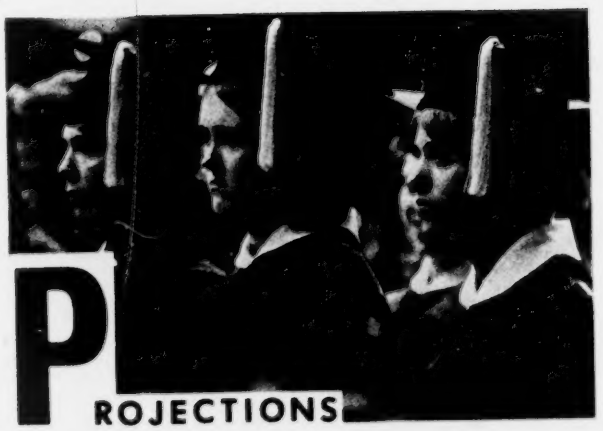
HIGHER EDUCATION ENROLLMENT PROJECTIONS



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FOREWORD

Both state and institutional planning for higher education require forecasts of numbers of students who will request college-level instruction in Washington. Such planning presupposes an understanding of the major influences which promote or deter college attendance. The work of the Population and Enrollment Section of the Office of Program Planning and Fiscal Management for the State of Washington, especially in relation to planning bases which this office provides to the Legislature, the Commission on Higher Education and to the colleges and universities, has necessitated careful attention to the matter of college enrollment.

An advisory committee was established, representative of all of higher education in Washington, to assist the Office of Program Planning and Fiscal Management in defining the factors which determine collegiate enrollment and to guide the development of procedures toward a useful tool. Of particular concern were those predictor variables which are possessed of three qualities: **1)** high impact on actual enrollment, **2)** easy accessibility, and **3)** adaptability to quantitative definition.

In the search for the best possible method for forecasting enrollment a concern prevailed for the development of procedures which drew upon both realistic and economically derived variables for prediction power as well as for accuracy of the forecasts which are generated.

The resulting procedure was a student flow model which provides an opportunity for adjustment of prediction variables in reaction to policy, program, student mobility patterns, and demographic factor changes. The model is additionally unique in that it provides high visibility for showing each of the individual factors and their empirical influence on each college and university forecast.

It might be in order to briefly note a few of the model's limitations. Both the development staff from OPP&FM and the advisory committee realize that had more time and resources been available, further attention might weli have been given to economic factors, the influences of employment, regional attitudes, and sociological variables such as rural-urban population shifts, and the increasing interest in, and opportunities for continuing educational opportunity for the educationally disadvantaged.

The motivational reasons for education have not been studied nor have the probable changes in the objectives and efforts of education at all levels been defined. The expansion of the model toward a true continuous flow concept is highly desirable.

Apart from the academic criticism of the model it remains functional and sensitive. As is to be expected when a fundamental procedure of broad dimensions is undertaken, direct applications are not to be anticipated from all of the first results; or at least not so immediately. The results can only give some direction to practical applications or suggest the procedures which produce results useful in decision making.

This work will constitute a first attempt at using a comprehensive model which employs economically derived and accessible variables. The model is dynamic in the sense that it responds full-fold to policy, demographic and student mobility variable changes. The model is the first of such complexity to be applied to all types and levels of higher education on a statewide scale. The agreement for implementation for testing by all colleges and universities in the state demonstrates the responsible and cooperative concern for the optimal development of post high school education in the State of Washington.

Ross O. Armstrong, Chairman
Advisory Committee for Improving
Enrollment Projections
Pullman, Washington
August, 1970

ABSTRACT

Under a grant by the U.S. Department of Health, Education and Welfare to the State of Washington Higher Education Facilities Commission in the amount of $47,702, a higher education enrollment projection model has been developed. The model operates on a student flow concept quantifying students through the flows of entrances, retention, transfers and exits. The model is based on the assumption that the manner in which students now move through the higher education system for Washington will be similar during the projection period.

Projections are produced for the entire higher education system of the State of Washington presently including 22 community college districts and 18 universities and colleges, 6 public and 12 private schools. An expansion feature has been programmed into the model so that potentially 25 community colleges and 20 universities and colleges can be handled. The model operates by annual iterations projecting students according to the number of students within each student flow. In addition the four-year institutions are projected by class for the undergraduate students. Community college projections contain source of students by student flow category with no class distinctions. The model is structured to operate as a projection-management information-planning model and can address *what if* type of contingency questions.

The model has been programmed in FORTRAN IV for the IBM 360 with core requirements of 110K. The program, flow chart, and operating instructions are included in the appendix.

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I. INTRODUCTION

In 1968, an extensive review of the various enrollment and enrollment related projection procedures in use in the State of Washington, was undertaken. Four separate projection procedures were being used by the Population and Enrollment Section which in reality were intimately related and interdependent, but since they had been developed independently for specific purposes the resulting projections from one when compared to another sometimes were inconsistent and difficult, if not impossible, to defend logically.

The four projection models concerned the subject areas:

1. Population by age and sex.
2. Public school enrollment from kindergarten through grade twelve.
3. Enrollment in five public institutions of higher learning in the state.
4. The undergraduate, on campus, full-time equivalent enrollment of public and private four-year colleges and universities in the state.

In the late fifties and early sixties, since the growth pattern of the state's population and enrollment was fairly steady and predictable, it was possible to use simple historical projection procedures. However, the rapid expansion of the community college system in the early sixties began to affect the enrollment distribution in the four-year institutions in the state. In 1960, there were 10 community college districts compared to 22 in 1969. Figure 1 shows all the institutions of higher education in the State of Washington.

Also, the effects of changes in the employment and migration patterns after 1960 seriously influenced enrollment growth. The decision to build a new four-year public college, which is to open in the fall of 1971, again emphasized the need for improving the existing independently operating projection models. Finally, and perhaps most important, is that in the fall of 1969, the University of Washington initiated the policy of limiting enrollment. The existing model is an individual school projection model and hence, with enrollment ceilings, the total pool of potential students or unmet student demand could not be determined. This fact again emphasized the need for improving the enrollment projection model.

Discussions with administrators and educators concerned with the application of the enrollment projections led the Council of University and College Presidents to recommend that the Higher Education Facilities Commission consider using the state's share of the Federal Planning Grant monies from Title I for a project to improve enrollment projection procedures. As a result of this recommendation, the Population and Research Division of the State Planning and Community Affairs Agency submitted a proposal to the Higher Education Facilities Commission which was approved in March of 1969, and was to begin July 1, 1969, and to be completed by July 30, 1970.

Shortly after the project was started, a reorganization of the State Planning and Community Affairs and the Central Budget Agency occurred. The Population and Research Division was transferred to a new agency, the Office of Program Planning and Fiscal Management (OPP&FM), and became a section within the Information Systems Division of that agency. Fortunately, little time was lost as the result of the reorganization of these agencies.

The first step after the grant had been approved was to request that the presidents of the colleges and universities appoint a representative to serve on an Advisory Committee for Improving Enrollment Projection Procedures. The Committee members appointed were:

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Denis Curry, Ex-Officio ..... Interinstitutional Business Studies

The basic assumptions taken in developing the design for the model was to assume, *the best of all possible data worlds.* The master plan was formulated as an ideal concept of what was ultimately desired without being limited in our thinking by the availability of data. The formulation of the ideal or desired concept of the system at the beginning was most important, for too often compromises are made in model development because of inadequate or insufficient data.

However, by realizing the data inadequacies and keeping in mind the model desired to fit into the best of all possible worlds, it was possible to design the model so that improvement in the data base would permit modular steps to be taken towards the *final* model and at the same time insure that an operating or interim model for testing was a product of the study. To this end, the Advisory Committee for Improving Enrollment Projections was invaluable in the review of each phase of the model development and in seeing that new data were furnished for the testing of the system design. Without the excellent cooperation of the committee members, this project could not have been completed on time.

For the most frequently used terms pertaining to the model, a glossary of terms including abbreviations is located in **Appendix A.**

Institutions of Higher Education in Washington

UNIVERSITIES:

PUBLIC:
1 University of Washington
2 Washington State University

PRIVATE:
3 Gonzaga University
4 Pacific Lutheran University
5 Seattle University
6 University of Puget Sound

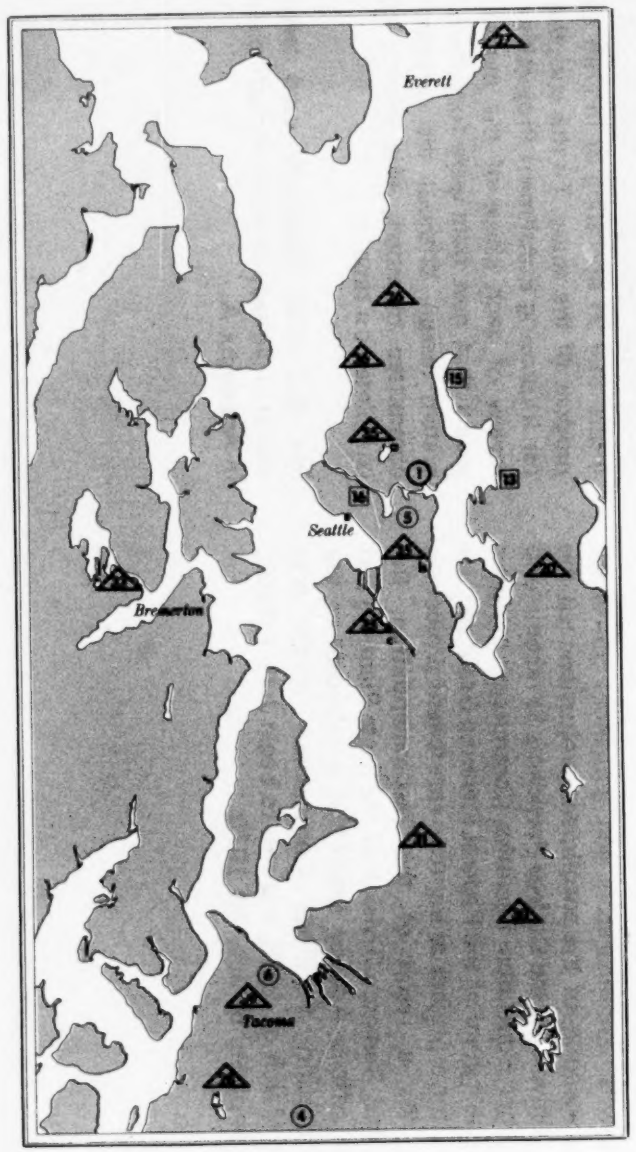
FOUR-YEAR COLLEGES:

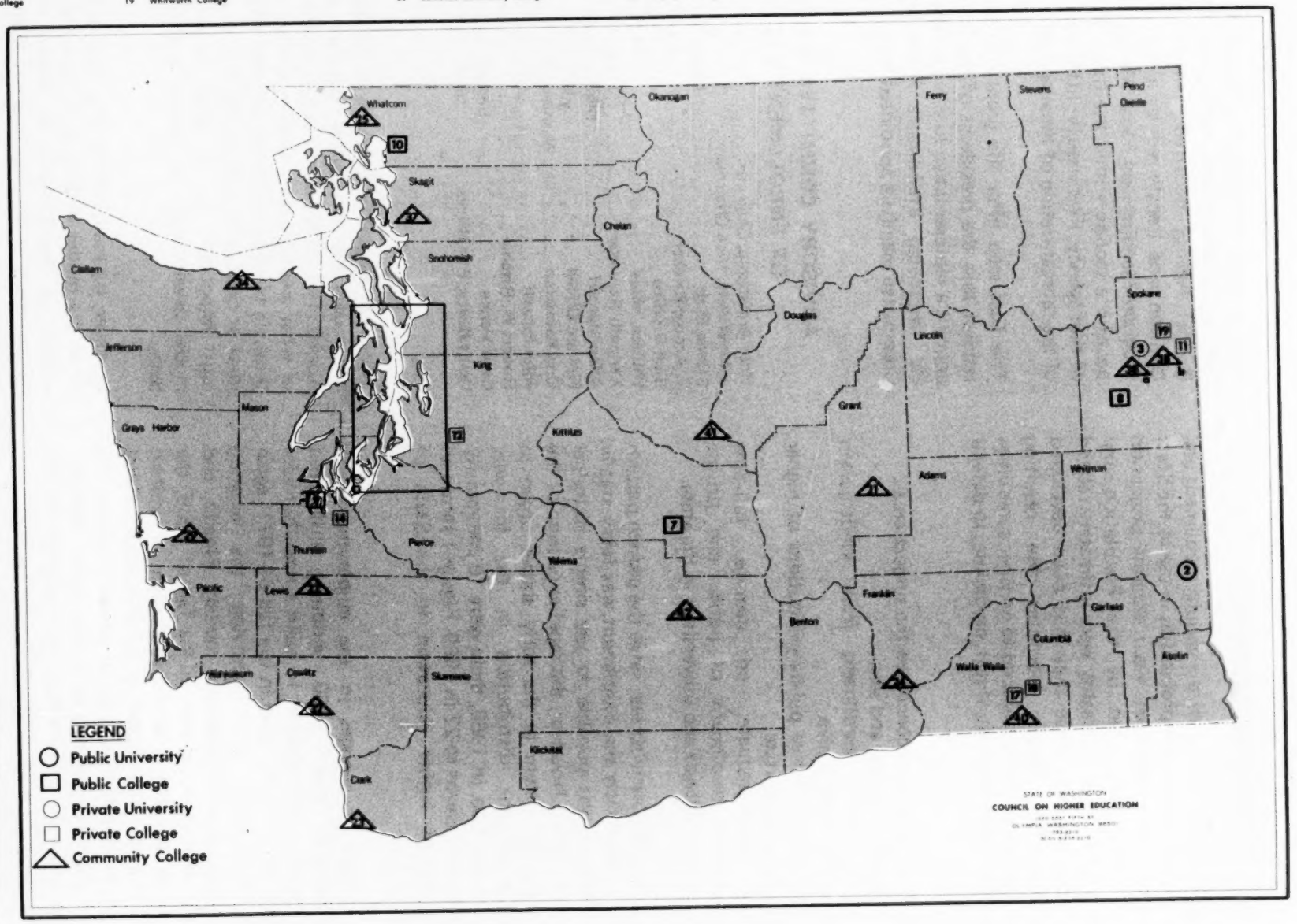
PUBLIC:
7 Central Washington State College
8 Eastern Washington State College
9 The Evergreen State College
10 Western Washington State College

PRIVATE:
11 Fort Wright College
12 Maple Valley College
13 Northwest College
14 St. Martin's College
15 St. Thomas Seminary
16 Seattle Pacific College
17 Walla Walla College
18 Whitman College
19 Whitworth College

COMMUNITY COLLEGES:

20 Bellevue Community College
21 Big Bend Community College
22 Centralia College
23 Clark College
24 Columbia Basin College
25 Community College District No. 21
26 Edmonds Community College
27 Everett Community College
28 Fort Steilacoom Community College
29 Grays Harbor College
30 Green River Community College
31 Highline Community College
32 Lower Columbia College
33 Olympic College
34 Peninsula College
35 Seattle Community Colleges
(a) North Seattle Community College
(b) Seattle Central Community College
(c) South Seattle Community College
36 Shoreline Community College
37 Skagit Valley College
38 Spokane Community Colleges
(a) Spokane Falls Community College
(b) Spokane Community College
39 Tacoma Community College
40 Walla Walla Community College
41 Wenatchee Valley College
42 Yakima Valley College





II. EVALUATION OF CURRENT MODEL

A. Projection Philosophy

Perhaps no other state in the nation has been provided with such regular and meaningful information pertaining to the actual as well as the expected growth in various levels and types of school enrollment as has the State of Washington. In 1950, **Dr. Calvin F. Schmid,** Executive Secretary, Washington State Census Board, was asked by the Legislative Budget Committee to prepare enrollment projections for grades 1-12 of the public school system. After this first request, the Legislature, by statute, directed the Washington State Census Board to prepare projections for the education system in the State of Washington each biennium for use in budget preparation and evaluation. The rationale for developing enrollment projections as a part of the budget evaluation process is obvious and incontrovertible. This system of producing enrollment projections, based on the most precise methods available, was designed to aid in decisions concerning the assessment of state educational needs and the allocation of appropriations.

The philosophy of projections is Janus-faced. One approach stresses the development of an infinite number of projections based upon policy alternatives. The other approach, and the one which this state has for the most part followed, involves the application of a conceptual framework, that is a model or technique within a well specified configuration of assumptions. The alternative projections are still possible with this scheme; however, they are not separate individual projections for each policy alternative, but rather one projection with upper and lower limits or measures of variation. Hence, the major variation between the two approaches is one of scope and degree as to which policy is utilized as a direct input, but both approaches must conform to the same set of basic statistical rules of operation.

Enrollment projections, as with most projections, are to be expressed as a range of values within which temporary fluctuations, minor policy changes, small changes of administration and other intervening variables will cause the actual enrollment to vary. Depending upon the use of the projections and known conditions, a working figure within the range is usually selected for a point-in-time. Given the state of the art, exact agreement between projection and actual enrollment occurs by chance and not by design, although close agreement is always sought.

B. Current Method Limitations

Before entering into the design of the new model, let us evaluate the present model now in use for its prediction and explanatory potential of student enrollment within the higher education system of the State of Washington. The current model is based on the class succession principle and was developed by the former Washington State Census Board. The evaluation of this model will consist of an analysis of its historical accuracy, a discussion of users' criticisms, and the anticipated effect of the new model on these criticisms.

Table 1 describes the differences in the forecasts versus the actual enrollments over the historical period, 1958-1968. The total enrollment of the five public universities and colleges was chosen in that one can assess the accuracy of the class succession model in the aggregate and not be affected by individual school anomalies. This table shows the percent differences in the projected and the actual enrollments in the near and long term. In every case, the first two to three years into the projection period are relatively close to actual enrollments (2-8%). The longer the projection period, the greater the discrepancy between projected and actual, in fact there is a consistent long-term, under projection bias. A small portion of this can be attributed to the model's structure in that the class to class survival rates were held constant after three years into the projection period. Two major policies have caused much of the difference in actual and projected enrollment; these being **1)** the increase in growth of enrollments, especially in the last three years, and **2)** for the year 1969, the limiting of enrollment at the University of Washington. The latter case understates the error in that the limited enrollment of the University of Washington increased the enrollments and the error at the four other public institutions. The post recession year projections in 1960 and 1964 led to an over projection, while in all other years there is a systematic under projection. During short recession periods, it is hypothesized that enough of the unemployed return to school temporarily to generate an artificial growth factor which results in an over projection. This means that the number of persons entering or remaining in the labor force is less, and conversely the number of persons entering or remaining in school is more during short recessionary periods.

TABLE 1

COMPARISON OF FORECASTED AND ACTUAL ENROLLMENTS FOR THE FIVE PUBLIC UNIVERSITIES AND COLLEGES

(Percent Difference from Actuals)

Forecasted Years	Year Forecast Made					
	1958	1960	1962	1964	1966	1968
1960	– 2%	--------	--------	--------	--------	--------
1961	– 2	3%	--------	--------	--------	--------
1962	*	, 6	--------	--------	--------	--------
1963	– 5	--------	- 4%	--------	--------	--------
1964	– 9	--------	- 8	--------	--------	--------
1965	–12	--------	- 9	5%	--------	--------
1966	–14	--------	-12	5	--------	--------
1967	–13	--------	-12	5	- 4%	--------
1968	–17	--------	-16	1	- 7	--------
1969	–21	--------	-21	- 4	-11	- 2%

***Negligible, less than 0.5%.**

C. Users' Critique

The users of the current enrollment projection model were asked to critique the model because they had the most knowledge of its strengths and weaknesses. These users

included the Population and Enrollment Section of the Information Systems Division and the enrollment contact person from the universities and colleges appointed by the president as the official liaison person to the Population and Enrollment Section. These users were encouraged to freely comment and criticize the existing model. **Development Note 1** in **Appendix B** is a report describing these criticisms as received by the interviewers. Without entering into too much detail, the major comments of impact on new model building are summarized below:

1. Policy inputs into the projection procedure are desirable and their effects on the system should be included in the projections.
2. Student credit hour projections are desirable.
3. Student flows should be explicitly measured and identified, e.g., entrances, retention, transfers, and exits.

In order to evaluate these criticisms and the anticipated effect of the resultant new model on these criticisms, each will be discussed separately:

1. In reference to the first comment on the desirability of policy inputs, when a school has publicized or announced a policy that would affect enrollment projections, it was stated that these policy inputs should be taken into consideration in any projections. This is a reasonable request; the old model is not as responsive as the new model is anticipated to be. The new model should improve the projecting of quantitative impacts of policy alternatives.
2. The second comment discussed the desirability of student credit hour projections. The new method is based on a student flow and, hence, on tracing students through the system. However, full-time equivalents (FTE's) are obtained by calculations performed on student totals, and by taking the derived FTE's and multiplying by the base of 15 hours per FTE would produce a student credit hour projection for undergraduate students. Again, this is a number derived by operating on projected students.
3. The third comment directed toward student flow has been incorporated totally and is the basic concept upon which the new model was developed. Head counts by student flow category are the factors to be projected.

D. Summary of Evaluation of Current Model

In summary, the current model methodologically still has much merit to it. However, certain aspects of the model could be improved or other additions could be made to provide more information in the projection procedure. The application of projected enrollments in the budget process have been noted as a difficult problem area. This problem cannot be solved but can be addressed with new models or new projection procedures by a conscious awareness within the budget process of how enrollment projections should be applied. The new model will answer the criticisms of student flow, improve on producing credit hours, and very much improve the handling of specific policy inputs.

III. SURVEY OF ENROLLMENT PROJECTION METHODOLOGY

A review was made of past Higher Education Facilities Commission, Comprehensive Planning Grant Proposals and the reports culminating from these grants. These past reports were examined for relevant information to this study. **Development Note 2** in **Appendix B** contains the review of these past HEFC reports. This section discusses the five principal projection concepts derived from the literature review. They are:

1. Rates or percentages applied to subgroups.
2. Multiple linear regression or lease squares procedures.
3. Cohort survival or class succession.
4. Combinations of above.
5. Markov-like processes.

These methods will be briefly described below followed by a hypothetical example. More detailed explanations of these methods can be found in *Methodology of Enrollment Projections for Colleges and Universities* by **L. J. Lins**[1]

A. Ratio Method

The ratio method determines the ratio between enrollment and some base population. This ratio is then multiplied by the projected base population to produce a projection of enrollment. The ratios may be stratified by dividing both the enrollment and base population data into subgroups, e.g., age, geographic area, and class standing.

For example, the average of the ratios between college enrollment and total population, ages 18-29, can be determined. This ratio is then applied to projected populations of this age group to derive projected college enrollment. The ratio method accuracy depends on the accuracy of the projected base population and the reliability of the ratio during the projection period.

B. Multiple Regression Methods

Multiple regression methods express mathematically an association among enrollment and one or more independent factors or variables.

The specific assumptions of this method are not readily apparent since regression analysis not only measures the correlation between enrollment and the selected independent variables, but also measures the intercorrelations between the independent variables. A more general basic assumption of this method, which is often ignored, is that the correlations and intercorrelations found in the historical data will be the same during the projection period.

This method is dependent upon the accuracy and availability of data for the selected independent variables and more importantly on the selection of the independent variables. It may be possible to find a variable that appears historically to be highly correlated with college enrollment, but is very difficult to reliably project. The data that are

[1] **L. J. Lins,** *Methodology of Enrollment Projections for Colleges and Universities,* American Association of Collegiate Registrars and Admissions Officers, 1960.

available for regression analysis have usually been prepared for purposes other than enrollment projections and changes in definition over a time series may seriously limit the usefulness of such data for enrollment projection purposes.

An example of the multiple regression method is the determination of enrollment as a function of high school graduates and population, ages 18-29, over a historical period. Then the projected number of high school graduates and population subgroups are applied in the regression determined equation to produce projected enrollment.

C. Cohort Survival or Class Succession

The cohort survival method attempts to determine the expected rate at which a group of individuals survives from one class to another (class succession) or one age to another (age survival). These rates are then applied to a historical enrollment base figure to produce enrollments for the forecast period. For example, the freshman to sophomore survival rate would be the number of sophomores at time t divided by the number of freshmen at time t-1. This survival rate is applied to the number of freshmen at time t to project the number of sophomores at time t+1.

The survival ratio is a composite measure reflecting the influence of several factors, among which are included retention, transfers, and dropouts. The basic assumption is that the relative influence of these factors on future enrollment will remain constant through the period for which the projections are developed. This assumption can be modified by studying several cohorts and perhaps establishing a trend in the change of the ratios over time. Least squares analysis is a commonly used method for determining the trends over time. This modification also assumes that the changes experienced in the historical period will continue in the projection period. Stratifications of the cohorts are sometimes incorporated in projection models. The current model used by the State of Washington stratifies by residents and non-residents. The cohort survival method requires enrollment data by class, or if age survival is used, by age. It is usually desirable to obtain the data for a relatively long (15 years) historical period. Consistency of the data using a long historical series then becomes quite important as there may very well have been changes in definition of what constitutes the elements to be projected.

D. Combinations of Methods

An example of the combination of methods is to utilize the ratio of freshman enrollment to the population, ages 17-19, to obtain projections of freshman enrollment. A cohort survival ratio is then used to project the sophomore, junior, and senior classes. The survival rate might be determined by using least squares analysis of the historical survival rates. Regression analysis may be used with both the ratio and cohort survival methods to modify the basic assumptions. The use of regression introduces the possibilities of weighting schemes and non-linear functions. Such refinements modify but do not basically change the structure in the assumptions of the methods.

The use of a combination of methods offers alternative forecasting procedures to the person making the projection. Furthermore, the stratifications of enrollment projections by various subgroups as well as the use of base populations produces valuable secondary information of use to decision makers. As an example, the stratification of enrollment by state residency is useful information about utilization of state-supported institutions. Also, the quantification of base populations measures the potential demand for higher education or *population at risk*.

E. Markov-Like Processes

A Markov Process is a random phenomenon which is developing in time and *obeys* probabilistic laws: "The probability that the enrollment system will be in a given state at a given time t_2 may be deduced from a knowledge of its state at any earlier time t_1, and does not depend on the history of the system before time t_1." Another term used in this sense is a Markov Chain which is a special kind of Markov process whose development may be treated as a series of transitions between certain values. These transitions between certain values are called *states* of the process.[2] Now the term Markov-like process has been used here in that the enrollment projection methods to be discussed do not always fulfill the definition of Markov processes.

The Student-Teacher Population Growth Model (Dynamod II) was developed by the National Center for Education Statistics of the Office of Education and is a mathematical model of the formal American educational system.[3] It was designed to measure the flows of students and teachers through the formal educational system and to be of use to educational officials, planners and analysts in examining the impact of policy alternatives on the educational populations at the national level.

The Dynamod II model has three basic assumptions:

1. A Markov-type process is a suitable means for representing the flows of people between categories. In this context the population is divided into various cross-classifications based upon sex, race, age and educational status. "One might consider Dynamod II as a Markov process superimposed over a growth function representing net births."[4]
2. The transition probabilities are fixed during the calculation interval.
3. Death rates are fixed during the caluculation interval.

A second model design based on a Markov-like process has been proposed by the Rensselaer Research Corporation to the Office of Planning in Higher Education, State Education Department, New York. The concepts and methodology suggested were for the construction of a computerized mathematical model to project higher education enrollment in New York State.

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[2] **Emmanuel Parzen**, Stochastic Processes, San Francisco, Calif., 1963, p. 187.

[3] **Edward K. Zabrowski**, et al., Student-Teacher Population Growth Model; U.S. Department of Health, Education and Welfare, August, 1968.

[4] *Ibid.*, p. 2.

The design paper recommended that the main structure of the model be a non-stationary Markovian process; that is, simulated students are aged and flow through the educational system in patterns determined by transition matrices whose elemental values are allowed to change over simulated time. A rather large class of techniques, including weighted regression analysis, was suggested as the means of modifying the matrices over time.

Also recommended was the provision for **Contingency Programs** to assist educational planners in answering questions of the *what if* variety. These programs would be separate computer models which alter parameters in the main model to measure the effects of such changes on enrollment projections. The structure of these subprograms was not delineated in any detail.

The reliability of the enrollment projections from the model was stated to be directly dependent upon the reliability, accuracy, and availability of the input information. Although the primary purpose of the design was to propose a mathematical model for projection purposes, substantial thought was given in the paper to the implications of a model for an educational information system. One of the recommendations was that the development of a higher education information system for New York State should be started concurrently with the development of a prototype projection model.

An example of a Markov method application is offered for illustrative purposes. This example will project seniors retained at an institution. The base period shows 20% of the seniors remained as seniors from one year to the next, 55% of the juniors remained in the institution and became seniors, and 10% of the sophomores moved to the senior classification. These percentages represent transition rates or in the Markovian sense, transition probabilities. In other words, the probability that a student will move from junior to senior class in this institution is 0.55 or 55 out of 100.

Now let's assume there are 5,000 sophomores, 4,000 juniors and 3,000 seniors in the base year. The first year's projection of retained seniors produces 500 from the sophomore class, 2,200 from the junior class and 600 seniors retained as seniors, totaling 3,300 retained seniors.

IV. A STUDENT FLOW MODEL

This chapter will describe the student flow concept as it has developed in the **Higher Education Enrollment Projection (HEEP) Model.** The structure of the model is presented and then compared with other Markovian based models. The concepts underlying the developed model are presented as well as the structure under which the model operates.

A. Student Flow Concept

The student flow concept implies the tracing of students into, within and out of the higher education system. The student flow categories selected for the model are **1)** entrances, **2)** retention, **3)** transfers, and **4)** exits. These flows are treated as sources of students for projection purposes with the exception of exits which measures the flow of students out of the education system. Therefore any single institution receives students from outside entrances into the institution, retention within the institution, and transfers into the institution. These four major student flows have been further classified in order to quantify students by more specific sources.

Entrances into the system have been classified into: high school graduates within the State of Washington, military, out-of-state sources, and *all other* sources. The four classifications of entering students attempt to quantify these sources to an extent which can be easily handled and with flexibility as the societal situation may change over time. High school graduates account for the greatest percentage of entering students. The military as a source of students is a reasonable estimate of the number of students on the G.I. Bill. The out-of-state element takes into account the high school graduates from other states as well as other out-of-state entrances from the general population. This source can be used as a control source under limited enrollment. The final category, all other, is a catch-all type category which picks up the person who has dropped out of the work force, housewives, etc., in the State of Washington and entered school.

These subclassifications of entrances are information sources and control factors in addition to their use as student projection sources. One of the primary benefits of model building is that the process forces one to think in terms of information needs as required by the model which can then be traced back to identify data elements and classification systems for data collection. The interaction of projecting and information collection are mutually supporting functions.

The relative distribution of the entrance flow as a percent of total undergraduate enrollment varies from 35% for the four-year schools to 70% for community colleges. The relative distribution of the four subclassifications within the entrance flow are presented in Table 2 for the public universities and colleges only. The numbers are presented merely to indicate relative sizes of each subclassification.

TABLE 2

Relative Distribution of Entrance Sources for Public Universities and Colleges—1969

Source	Range (%)
High School Graduates	45-55
Military	1-2
Out-of-State	3-7
Other	37-55

Retention in the student flow model are those students within an institution who continue the next year in that same institution. In order to more accurately portray movements within an institution, retention factors have been developed for each class to all other classes the next school year. For example, freshmen in one school year most likely move to sophomores the next school year, however, other possibilities are to remain as freshmen, or

move to junior or senior status. The retention factors then account for all movements of student from one year to the next year within an institution.

The amount of total enrollment represented by retained students varies from 25% in the community colleges to 55% for the four-year schools. In addition the relative distribution within the public universities and colleges of retained students by class is presented in Table 3. It should be noted that the Community College Board data does not recognize class breakdowns and hence, the model does not include any class breakdown for the community colleges.

TABLE 3

Relative Distribution of Retained Students for Public Universities and Colleges—1969

Source	Range (%)
Freshman	34-38
Sophomore	26-31
Junior	25-31
Senior	6-8

The third movement within the student flow structure is that of **transfers** from one institution into another institution. The possibility of transferring imparts itself to all classes for all institutions; also, a student can transfer into an institution from out-of-state. Hence, there is a large number of possibilities within the transfer scheme, and with a growing community college system, the incidence of transfer students is increasing.

The number of transfer subclassification sources consists of one for each institution plus one for transfers from out-of-state producing 41 transfer sources. The percent of total enrollment accounted for by transfers is about 4% for community colleges and 10% for four-year schools.

The final student flow element is **exits** from the system. These exits are a single category but consist of graduating students, transfers out of the institution, and students leaving the system without receiving their degree. Exits from the system range from 35% of total enrollment for four-year schools to 60% of total enrollment for community colleges.

B. Model Structure

With the basic factors of student flow now described, the problem is to simulate the relationships of these student flow elements through time in order to project a flow of students and arrive at a total enrollment. *The obvious assumption of the model's structure is that the four basic student flow elements are mutually exclusive statuses for any student at any particular time.*

The problem now is to structurally and operationally simulate the student flows in some systematic framework. The **HEEP** model is patterned after a Markov chain. This implies that the *observations* on the higher education enrollment process *obey* the probabilistic laws. Now departure from specific assumptions do occur, however, the basic Markov chain structure and principal operational elements have been maintained in the **HEEP** model. That is, the model uses a transition matrix and processes an input vector iteratively. The cells of the transition matrices are referred to as transition rates and the input vector contains base period enrollment at all institutions plus other base populations from which students emerge; a vector being merely an ordered collection of numbers. This linear-algebraic structure has been used as the basis for the present pilot model. The input vector in the base year is multiplied by the transition matrix to produce an output vector, which can be iterated through the transition matrix for each subsequent projection period. However, the transition rates can change in the projection period.

The individual components of the input vector and the matrices will be described in the next chapter. However, at this time, some of the operating procedures in the model will be described. Figure 2 presents a block diagram illustrating the operating structure of the model. The student totals at a point in time, t, are entered into the model along with the projections for the exogenous variables at time $t+1$. The **HEEP** model then operates on these parameters to produce a projection of students at time $t+1$, which are generated by student flow categories. For subsequent years of projections, the student totals at time $t+1$ are recycled with new exogenous variable projections.

The model operates on the assumption that future enrollment by student flow and its classifications is derived through the probability of students moving from one classification to another classification the next year. Once a student enters the higher educational system, there is a limited number of alternative paths in which to move from year to year. That is, once entering as a student, the individual either continues on, transfers, or exits. The major control point or growth function occurs through entrances into the system. The two largest subclassifications of entrances are high school graduates and "other" in-state sources. This latter category indicates many re-entrances into the system. The base population from which these re-entrances are calculated is the Washington state population ages 18-29.

Now, there will be fluctuations in the matrices' cells over time as changes in the system are realized. Those changes will be reflected in the transition rates the very next year when the new data is processed by the model. However, for any one projection period, the individual cells in the matrices are generally assumed constant and representative for the projection period. *Given any dramatic change in the higher education system, the transition rates themselves will react and adjust to the change in the system. Hence, this projection scheme should be most reactive to changes both major and minor, within the higher education system. In addition, the transition matrices will also react to abnormal changes as well and if not adjusted, incorporate them into the projections.*

The basic model and its student flow classifications operate on undergraduate students only. Student projections are

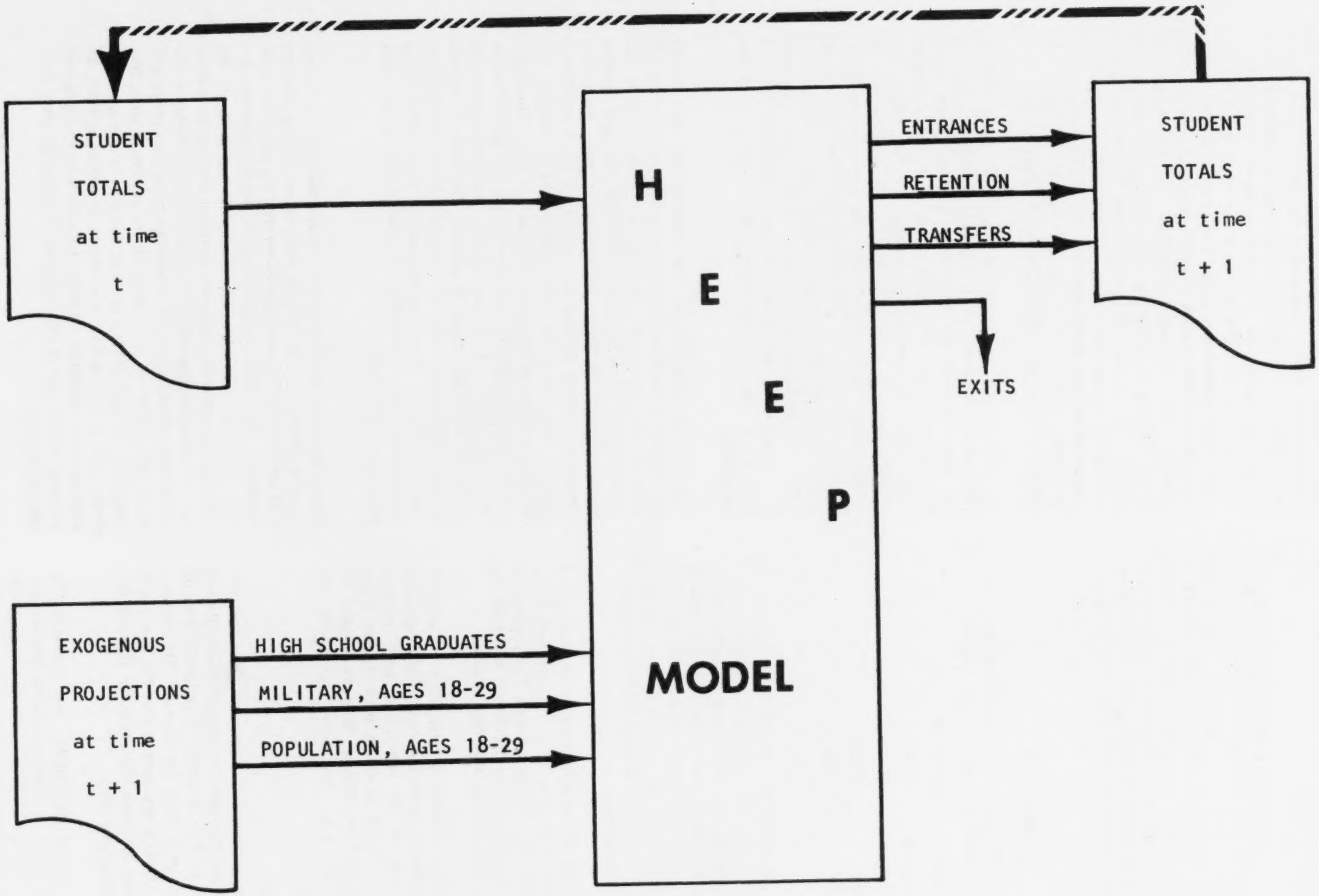

STUDENT
TOTALS
at time
t
H
E
E
P
MODEL
ENTRANCES
RETENTION
TRANSFERS
EXITS
STUDENT
TOTALS
at time
t + 1
EXOGENOUS
PROJECTIONS
at time
t + 1
HIGH SCHOOL GRADUATES
MILITARY, AGES 18-29
POPULATION, AGES 18-29

FIGURE 2

desired by two separate agencies and involve two different definitions. This situation is solved by applying ratios and adding to the undergraduate student totals. More details on this subject are offered in the chapter to follow.

C. Comparisons With Other Markovian Models

The **Rensselaer** design, **Dynamod II** and **HEEP** have two characteristics in common. The basic structure of all three models is by analogy closely related to Markov processes. Each model allows the user to change selected matrix values to measure the effects of these changes on enrollment projections.

Dynamod II and **HEEP** are similar in that both introduce an external growth function into the models. In **Dynamod II** this function is represented by net births. In **HEEP** this function is represented by the various entrance population bases; high school graduates, military population, Washington State civilian population. These two models have basically different purposes: **Dynamod II** is designed to provide a description of the formal American educational system useful for analysis of policy impacts; **HEEP** is primarily designed to provide enrollment projections of the higher education system in Washington State and secondarily concerned with analysis of the impact of policy changes.

The **Rensselaer** design and **HEEP** have the same primary objective; projection of enrollment for a statewide higher educational system. The **Rensselaer** design has a differing classification scheme but is also based on student flows. Also, the provision for systematic changes of the matrix cell values over time during the projection period was incorporated in their design. It should be noted that future development on **HEEP** may consider this latter point if indicated.

V. MODEL DESCRIPTION

The previous chapter presented the structure of the **HEEP** model. In this chapter the individual components will be identified as well as some of the operational relationships. The matrices are discussed first followed by the vectors and then the exogenous inputs.

A. Components of the Transition Matrices

The transition matrices relate *status at time 1 to status at time 2.* The rows of these matrices can be conceptually related to correspond with time 1 or the input side, and the columns with time 2 or the output side. Before getting into the detail of any one matrix, the general classification procedure will now be described.

Presently, each of the 22 community colleges are carried as single entities without further class breakdowns. That is, for any one community college in the base year and in the projection period, there is only one classification for that community college. The Community College Board does not consider classes in its data collection and data reporting operations, therefore this no-class policy is continued in the model.

The next major category of discussion is the 18 public and private four-year institutions (including The Evergreen State College to open in the fall of 1971), where the four undergraduate classes for each of the 18 institutions are maintained. In addition to the above institutional classifications, there is a total of five noninstitutional classifications, four dealing with entrance students, and one with transfers from out-of-state. The numerical array descriptions to follow are proffered for aid in conceptualization and not for designation of detailed array sizes.

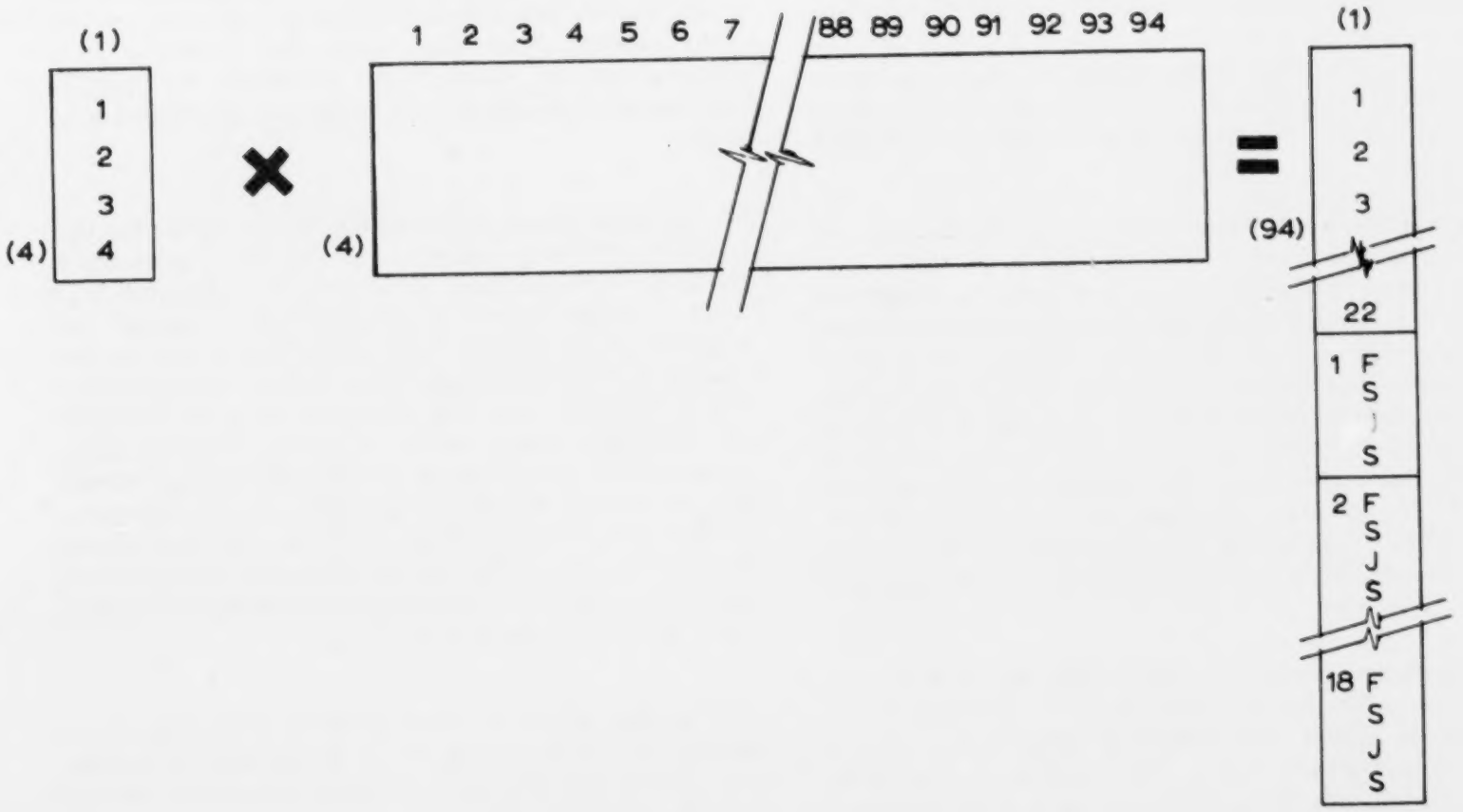
The **entrance matrix** is dimensioned 4 x 94, where the four input classifications represent: **1)** high school graduates in the State of Washington, **2)** military, **3)** Washington State "other sources," and **4)** out-of-state "other sources" (see Figure 3). *A point to be made at this time* is that the two classifications of Washington State "other" and out-of-state "other" are both calculated from, and hence are a function of, Washington State civilian population. The 94 output classifications are the same for the entrance and transfer matrices and are derived by subdividing into 22 community colleges and 18 four-year schools, each with four classes. The 18 four-year schools are the five public schools now in operation plus The Evergreen State College beginning in 1971, plus 12 private schools.

The **transfer matrix** is dimensioned 41 x 94 where 41 is determined by the categories of 22 community colleges, plus 18 four-year schools, plus one for out-of-state transfers into the system (see Figure 4). Note, the input side of the transfer matrix contains four-year school totals with no class breakdowns but output is by class. Also to be noted is that the diagonal of the transfer matrix, which relates to retention, is by definition, zero.

The **retention matrices** are separated into the four-year institutions and the community colleges. The four-year school matrix is 18 x 4 x 4, and the community college matrix is 22 x 1. For the four-year schools, this matrix can be conceptualized as a three dimensional matrix with a 4 x 4 upper triangular cross section for each institution; the four classes on the one dimension, at base year, against the four classes on the other dimension in the projection year (see Figure 5). Hence, the base year enrollment by class, multiplied by this retention matrix, produces the retained students in the projection period, by class. Figure 5 also illustrates the community college retention element.

The **exit matrix** is of dimension 40 x 1. For each of the 22 community colleges plus 18 four-year institutions, this matrix represents exit rates from each of the institutions. The exit matrix rates are calculated by summing the base year transition rates within the three previously described student flow matrices and subtracting from unity to arrive at the residual which by definition exits from the system. This produces an internally balanced system. No more than 100 percent of the total students at time t are allocated to various statuses at time t + 1 in any iteration. The possibility of additional classification of exits is being explored.

ENTRANCE ELEMENT OF PILOT MODEL



INPUT VECTOR

DIMENSION 4 X 1

1. HIGH SCHOOL
2. MILITARY
3. IN STATE
4. OUT OF STATE

ENTRANCE SOURCES

ENTRANCE TRANSITION MATRIX

DIMENSION 4 X 94

COMMUNITY COLLEGES	22
18 FOUR YEAR SCHOOLS	72
EACH WITH 4 CLASSES	
TOTAL	94

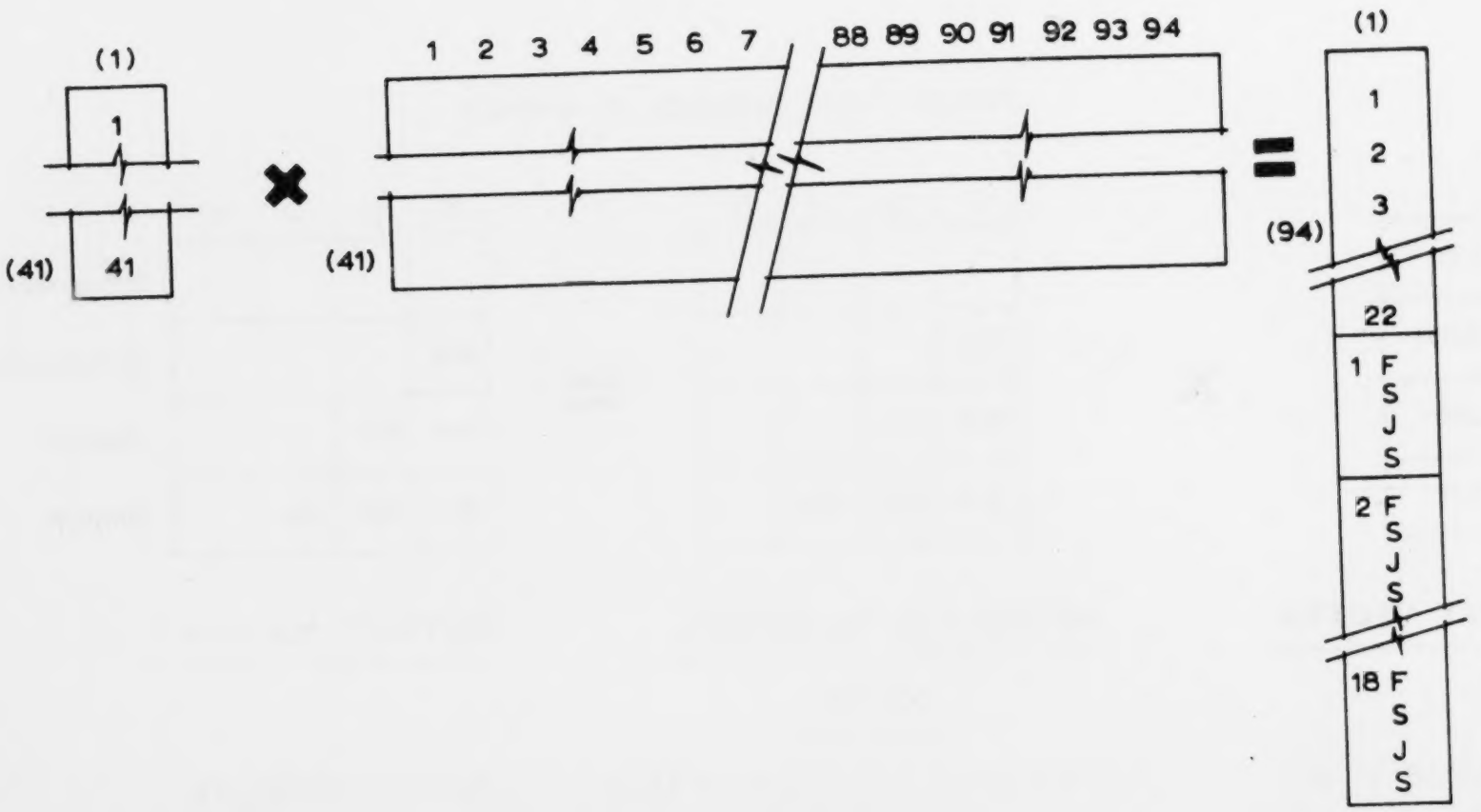
OUTPUT VECTOR

DIMENSION 94 X 1

ENTRANCES INTO SCHOOLS BY CLASS

FIGURE 3

TRANSFER ELEMENT OF PILOT MODEL



INPUT VECTOR

DIMENSION (41 X 1)

COMMUNITY COLLEGES	22
FOUR YEAR SCHOOLS	18
OUT OF STATE	1
TOTAL	41

TRANSFER TRANSITION MATRIX

DIMENSION (41 X 94)

OUTPUT VECTOR

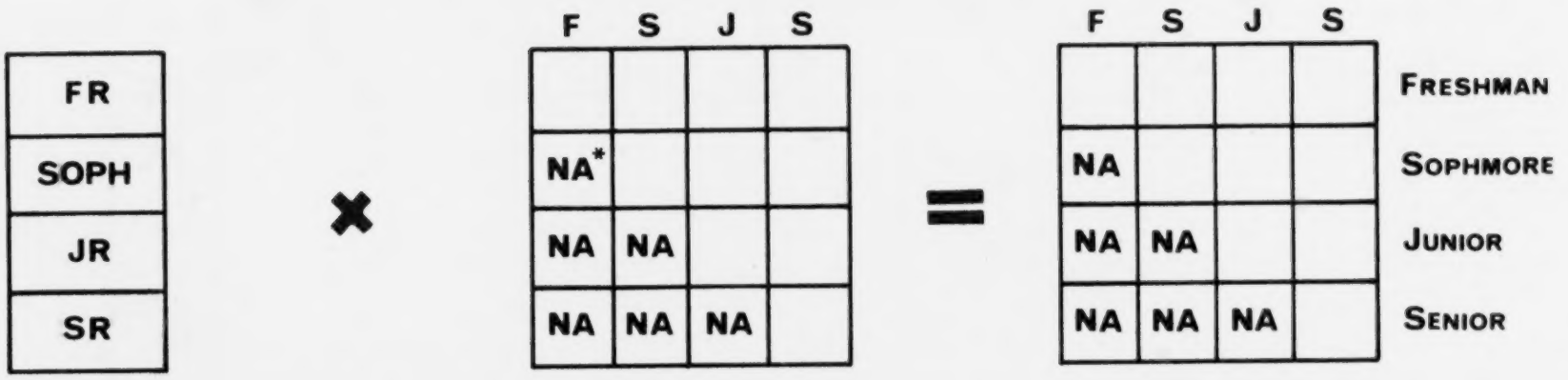
DIMENSION 94 X 1

TRANSFERS INTO SCHOOLS BY CLASS

FIGURE 4

RETENTION ELEMENT OF PILOT MODEL

FOUR-YEAR SCHOOL EXAMPLE



INPUT VECTOR

ENROLLMENT BY CLASS FOR EACH SCHOOL

RETENTION TRANSITION MATRIX

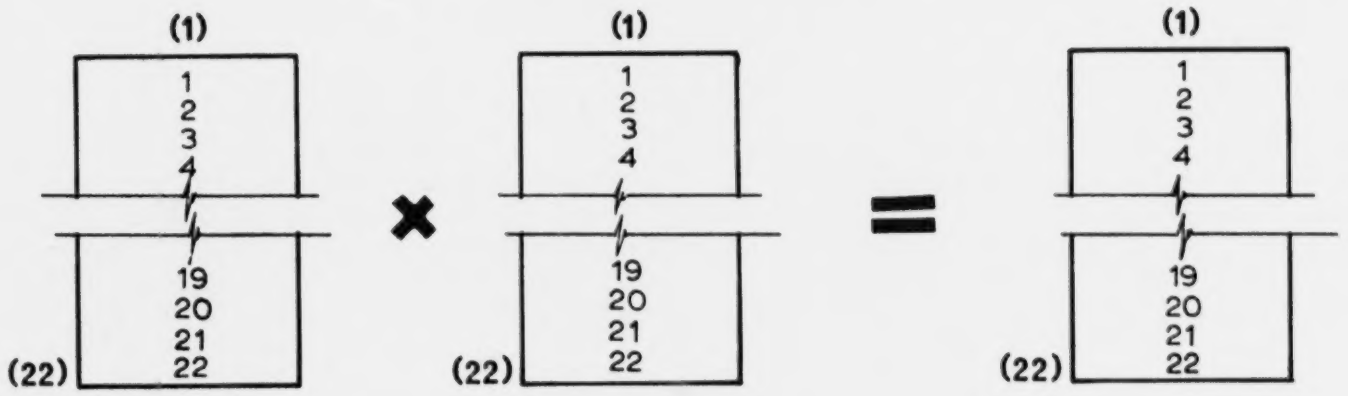
4 x 4 UPPER TRIANGULAR MATRIX FOR EACH FOUR YEAR SCHOOL

OUTPUT MATRIX

RETAINED STUDENTS CLASS BY CLASS

*NA - Not Applicable

COMMUNITY COLLEGES



INPUT VECTOR, RETENTION TRANSITION MATRIX, AND OUTPUT VECTOR ARE ALL OF DIMENSION 22 X 1; ONE ELEMENT FOR EACH COMMUNITY COLLEGE.

FIGURE 5

B. Components of Vectors

For each of the four transition matrices described in the previous section there are four input vectors of equal dimension to the corresponding transition matrix. In other words, for the transfer matrix which is 41 x 94, there is an appropriate input vector containing 41 elements and similarly for the other three matrices. However, these four input vectors are merely four groupings of the same input data and hence, will be described as one vector. This vector can then correspondingly be ordered according to the matrix demands. Each element within the input vector represents the enrollment or base figure for that appropriate classification in the base year; for example, University of Washington freshmen contains the number of freshmen in the University of Washington during the base year. The input vector is composed of 94 institutional categories composed of 22 community colleges, plus 72 four-year school elements consisting of 18 schools each with four classes, and four noninstitutional categories. The noninstitutional input elements are the four categories of high school graduate, military, in-state and out-of-state. Hence, 98 elements are needed for the input vector. The output vector contains the 94 institutional categories. For multiple year projections the output vector of the first year is used as the input vector for the second projection year and similarly for multiple years with the nonenrollment populations being externally inputted.

C. Other Data Input Elements

As stated earlier, the model is structured about the normal flows of undergraduate students through the system of higher education. In addition to the undergraduate students there are the graduate students and students classified according to various special definitions. *These nonundergraduate students have been handled as "add-on" categories for professional, graduate, and special students.* Another question arises with regard to noncompatible student definitions. Needs currently exist for student headcounts, upon which the model has been built, and full-time equivalent (FTE) student enrollment. These problems are discussed below.

Professional student enrollment is primarily a function of a limited number of facilities. Hence, each professional school (Medicine, Dentistry, Law, etc.) knows the number of students it can admit each year.

Graduate students are currently being handled in a similar manner; however, this case is not as definitive a situation as professionals. For the first phase of operation, it is the consensus of opinion of the Advisory Committee on Improving Enrollment Projections that graduate students can be most reasonably handled outside of the student flow scheme.

Special students by definition are not students who are in the flow concept. Hence, the external projection and flexible definitional attributes are of benefit to the producers of enrollment projections.

All of the above described add-on students are added to the total enrollment category and not allocated to any class.

The Council on Higher Education (CHE) monitors FTE on-campus undergraduate enrollment. A ratio by class of FTE's per student for each school is applied to the undergraduate class totals to generate an FTE enrollment total for each school. In addition, an add-on FTE is included in the model for the student definitional differences, should these occur.

The resident vs. nonresident dichotomy is a traditional carry-over from the existing procedures. Yet its utility is positive as it produces a measure of service derived by Washington residents *vis-a-vis* nonresidents. This residency dichotomy is applied only to the four-year schools and not to community colleges and is calculated by applying ratios by class.

VI. OPERATIONAL ASPECTS OF THE HEEP MODEL

The **HEEP** computer program and its input and output are discussed in this section. The examples included in the text should well illustrate the potential utility of this model as a flexible projection model, a management information model, and as a planning model.

A. HEEP Computer Program

The basic student flow structure and the model description were described earlier. In this section the data management functions of the computer program are discussed (see Figure D-1 in **Appendix D**). The flow chart primarily shows the data management or bookeeping functions of the program. **Appendix D** contains the FORTRAN program of the **HEEP** model. The modular structure of the model is immediately visible by the size and function of the mainline program plus the number of subroutines. In addition, the version listed here contains a presently nonfunctional subroutine PROMAX, which will be developed to reallocate students due to enrollment limits being exceeded.

B. Model Input

The design criteria of flexibility and simplicity which extended throughout the program design was also applied to the model input. Input of basic student flow data can be from any device, i.e., tape, disk, card, and the record layout is consistent for all data input as illustrated in **Appendix E.** The detail discussion on card input formating is also included in **Appendix E.** However, for any school in any year, one can change the transition rates either on a temporary or permanent basis. This rate change can occur through the changing of the cell value, the base value, or the rate itself. The input structure is thus designed for simplicity of operation to avoid input errors as well as aiding the researcher or planner in asking *what if* type questions. These aspects will be addressed now.

C. Model Output

The components of the output vector were briefly described in the previous chapter. The interpretation of the ordered numbers of the output vector is the subject of discussion to follow. Projections by class are generated in the model for all student flows with the exception of exits. Since the model calculates to this level of detail, the reports generated by the model preserve and present this level of

detail. The three major output classifications are **1)** by institution, **2)** time through the projection period, and **3)** types of student flows. A fourth analysis classification has been added, that of difference and percent difference from year to year when all schools are processed.

The available output reports cover all of the four classification options noted above. That is, one can specify **1)** which or all institutions is desired, **2)** projection over what time period if any is desired, **3)** specification of student flow types desired, and **4)** if difference analysis is desired or not (naturally, dependent on request of projections over time). However, these four option areas do not react completely independent. A few examples should clarify the above four classification procedures.

EXAMPLE 1: Request **a)** for all schools, **b)** projections for 5 years, **c)** number of entrances and totals, **d)** with difference analysis.

EXAMPLE 2: Request **a)** for University of Washington and Seattle Community College, **b)** no projections, base year data only, **c)** for all student flows, **d)** and hence, no possibility for difference analysis.

EXAMPLE 3: Request **a)** for Washington State University, **b)** 20-year projections, **c)** of transfers by which institution transferring from, **d)** and no difference analysis possible.

As illustrated by the examples, the output specifications provide tremendous research potential as well as utilization as an information source. Furthermore, the capability of changing any cell within any matrix at any time in a projection period is a feature of the model. This implies one can ask certain *what if* questions or incorporate the quantification of policy decisions. Again, a few examples should well illustrate this feature.

EXAMPLE 1: *Assume a university, due to an enrollment ceiling, decides not to accept any more out-of-state residents.* Then the out-of-state entrance cell rate is set to zero and hence, no students are projected for this category.

EXAMPLE 2: *What would the resultant enrollment projections be if entrance requirements were tightened?* This question requires a quantification of the relationship between tightening entrance requirements and the change in the associated entrance cell rates. However, given one year's history in a cause-effect relationship, one can then project that policy decision.

Knowledge of the interrelationships among flows and between cells can be acquired over time as more experience is gained in the model's operation. Also, the resultant impact of various policies will be measured.

The models output possibilities are such that it can be used as a projection model, an information source, a research tool, and as a management information system. It is anticipated that the model's application will be applied in all of the above situations. Other possible areas of application are as an input to a resource projection model or resource allocation model.

VII. SUMMARY AND CONCLUSIONS

This final chapter of the report contains a summarization of accomplishments achieved under the grant and concluding remarks. Accomplishments have included the development of a model and a very much improved information base. The conclusions to be derived from these efforts indicate the need for further testing, and the need for future development in various areas.

A. Summary

An interactive, modular design concept was initiated without regard to data availability or accuracy with the intent to build a projection model based on meaningful information areas or subject parameters. Once this design was conceived and organized it was decided to enter immediately into developing a feasibility model. Future efforts to improve the model could then be directed from an existing and workable data base.

The model presented and described in this report is this resultant product, a pilot or feasibility model. It was designed and programmed to be receptive to changes, in fact, many future developments were actually anticipated in the design framework. **The time reference in the HEEP model is fall to fall, however, other time periods can be considered and incorporated into the model if desired at a later date.**

One of the initial design concepts to be lost in the development was that of projecting a control total or enrollment potential and then allocate students to schools. There are many problems involved in generating control totals by certain characteristics; these problems were not addressed, although future development must rigorously analyze this area. The growth factor in the projections emanating from **HEEP** can be controlled to some extent through the entrance matrix. **Additional characteristics of students are desired if enrollment limitations do spread so as to adequately define the groups subject to controlled entrance into higher education.**

In the process of model building, one is forced to think in terms of information needs required by the model. These information needs then identify data elements and perhaps more importantly the classification of these data elements for data collection. **These processes have aided the improvement of data collection procedures both by the institutions and the agencies responsible for manipulating the data for enrollment projections and then budgeting. Hence, an improved information base has evolved and will continue to evolve.**

B. Conclusion

The conclusion is basically more work is needed to test the model and then enter into future development where indicated. A few test areas will be discussed along with planned future development now being considered followed

by a tentative timetable on the implementation schedule for the model.

Results from the HEEP model will be compared against the projections from the current class succession model. Both projections should behave similarly and possess similar class distributions.

Other analyses will pertain to the HEEP model itself. The sensitivity of projections to changes of cell values within matrices will be measured. Once these sensitivity relationships are measured then the determination of the amount of stability required or desired of the matrices will follow. These two analyses will provide answers to potential future developments for the complex areas of adjustments in matrices within the projection period. Furthermore, the quantification of various policy decisions on matrix values must be accomplished if the flexibility of the model is to be completely utilized.

In the area of possible future developments in the model, first and foremost is the problem of reallocation of students due to enrollment ceilings. Graduate and professional students should be projected within the model and not outside the model as they now are. Readily developable is the further classification of exits by class and where the exiting student goes, i.e., graduate, transfer, or dropout.

Additional stratification of entrances by geographic areas, perhaps counties, is desired. This would allow more refined projections of community college enrollment especially. Similarly, the parameters relating to social characteristics should be included. Management decisions and advance planning can be much improved with the additional data elements just mentioned. Efforts are underway to develop a model which projects social characteristics of the population. Hence, once developed these two models would be interactive.

The fall term of 1970 will be the first test point for the model. At that time a decision will have to be made whether to change over to **HEEP** for 1971. Also, for the first time in the fall of 1971, new data items presently needed will be collected and will serve as a benchmark for evaluation, testing, and development of future modular improvements.

The Western Interstate Commission for Higher Education (WICHE) has expressed interest in the **HEEP** model. Therefore additional efforts in further refinements and developments may soon take place.

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APPENDIX A

Glossary

BASE POPULATION: The total population to which a rate is applied for projecting or the total population in the base period which is divided into the appropriate cell population to determine the transition rate.

BUDGET ENROLLMENT: All academic students included in the Council on Higher Education enrollment plus students enrolled in graduate programs, first professional degree programs and students enrolled in off-campus courses.

CELL POPULATION: The number of students classified in a cell of a matrix in the base period.

CHE: Council on Higher Education.

CHE ENROLLMENT: All undergraduate academic students enrolled for at least one credit in on-campus courses. Students enrolled in graduate programs, first professional degree programs requiring three or more years of previous college work for entry or programs extending beyond the fifth year of college are excluded.

CLASS STANDING:

Class	Credit Hours	
	Quarter System	Semester System
Freshman	0-44	0-29
Sophomore	45-89	30-59
Junior	90-134	60-89
Senior	135 and over	90 and over

CLASS SUCCESSION: A specific cohort survival method in which the cohort is a class that is survived as it moves from class to class over time.

COHORT SURVIVAL: A method based upon the extent to which a group of individuals having a similar classification trait survive with the passage of time.

COMMUNITY COLLEGE DISTRICTS:

Centralia	Yakima Valley
Clark	Big Bend
Columbia Basin	Spokane
Everett-Edmonds	Shoreline
Grays Harbor	Green River
Highline	Tacoma
Lower Columbia	Seattle
Olympic	Bellevue
Peninsula	Ft. Steilacoom
Skagit Valley	Walla Walla
Wenatchee Valley	Whatcom

COMMUNITY COLLEGE BOARD: State Board for Community College Education.

COMMUNITY COLLEGE STUDENT: A student enrolled for one or more credit hours in an academic or vocational-technical course on the eighth day of instruction of the fall term.

DYNAMOD II: A mathematical model of the formal American educational system developed by the National Center for Educational Statistics.

ENTRANCES: Those students enrolled in the designated institution during the present fall term who were not enrolled in any higher education institution during the previous fall term.

FTE ENROLLMENT: (Full Time Equivalent) An index derived from the number of student credit hours for which CHE enrollment students are registered divided by 15.

HEEP: Higher Education Enrollment Projection. Used in conjunction with HEEP Model to describe the model in this report.

HEFC: Higher Education Facilities Commission. This commission has been reorganized and is now a part of the Council on Higher Education (CHE).

LOWER DIVISION COURSES: All courses at the public universities and colleges numbered between 100 and 299.

ON-CAMPUS: All academic students registered for credit in courses at the principal facilities of the school. Students who are registered for courses at branch institutions or centers not on the home campus are not included.

OPP&FM: Office of Program Planning and Fiscal Management. The agency under which the developing staff are located.

PRIVATE FOUR-YEAR COLLEGES:

Fort Wright College
Gonzaga University
Northwest College
Pacific Lutheran Univ.
St. Martin's College
St. Thomas Seminary
Seattle Pacific
Seattle University
Univ. of Puget Sound
Walla Walla College
Whitman College
Whitworth College

PUBLIC FOUR-YEAR COLLEGES:

University of Washington
Washington State University
Central Washington State College
Eastern Washington State College
Western Washington State College
The Evergreen State College (to open fall, 1971)

RATE: See Transition Rate.

RETENTION: Those students enrolled in the same institution in both the present fall term and the previous fall term.

TRANSFER: Those students enrolled in the designated institution during the present fall term who were enrolled at a different higher education institution during the previous fall term.

TRANSITION RATE: The resultant number derived by dividing a cell population by the appropriate base population.

UPPER DIVISION COURSES: All courses at the public universities and colleges numbered between 300 and 499.

APPENDIX B

This appendix contains Development Notes One and Two which summarize the extensive searches performed prior to the formulation of the general model and subsequently the pilot model. One report covers criticism of current methods and the other report evaluates enrollment projection methods.

Development Note One summarizes the responses from persons in each public four-year school and in the Budget Division of OPP&FM regarding the limitations of the class succession method of enrollment projection presently utilized by this office. The needs and suggestions from these persons as primary users of the enrollment projections became a part of the criteria of desirable characteristics for the general enrollment model.

Development Note Two summarizes the review of Higher Education Facilities Commission Grant Proposals and reports from other states. Particularly noted was the methodology for enrollment projections used in other states and proposals regarding the development of new techniques in enrollment projection.

DEVELOPMENT NOTE I

LIMITATIONS OF CURRENT METHOD

One of the first efforts of the project reviewing enrollment projection methods concerned the identification of shortcomings in methods being used presently. All public four-year institutions of higher learning were contacted, in addition to the Budget Division of Program Planning and Fiscal Management. Each group was asked, as primary users of the projected enrollment figures, to comment on any limitations of the methods or their application. In effect, the role of enrollment projections in general was thrown open for discussion.

The following is intended as no more than an itemization of responses from each institution. At least three introductory notes are appropriate, however. First, identification of the respondent has been excluded in an effort to preserve a free exchange of ideas and concerns. Second, difficulties with the current methods that have become obvious to the research staff through direct experience have been blended with a listing from the Budget Division. Third, selected areas of concern (e.g., potential students, enrollment ceilings, and consideration of other than fall enrollment) were introduced by the staff for reaction from each institution. The nature of all other responses remained undirected. They reflect not only limitations of the current method, but also suggest elements to be included in future methods, particularly with reference to any problems that might be peculiar to the State of Washington in the development and financing of higher education.

GROUP 1

1. Sources of and exits for students should be detailed.
2. Empirically identified factors of student origin and success should be taken into account (socioeconomic level, ability, college preparation of high school students).
3. Consider first time enrollees, returning students, and transfers separately.
4. Take course level into account.
5. Relate to sources of students and potential by some areal breakdown of state.
6. Maintain detail of projecting each public and private institution, the level of detail for the community college system to be determined later.
7. Total student credit hours should be projected with the same scheme being used for HEFC and state budgeted students.
8. Return to a range of projections for contingency.
9. Explicitly consider variation in rate of college attendance by high school graduates.
10. Provide for policy inputs of special students, enrollment ceilings, graduate and professional students. Other policy areas (e.g., change of deadline dates, tuition levels, entrance requirements) should be accounted for as completely as is possible.
11. In general, generate a scheme which would accommodate any number of combinations of explicitly articulated assumptions, the operation of which may be traced to a definite configuration of projected enrollment figures.
12. Include community colleges.
13. Correct systematic error at any one school.

GROUP 2

1. Must include policy considerations. Contingency fund will probably not be adequate. Accuracy of the projections is still foremost.
2. Methods must be made known to users to make a proper evaluation of released projections.
3. Any model should be no more than a tool of the legislature and the Higher Education Coordinating Council. The burden currently is being misplaced upon the enrollment figures. It should rest more squarely in the legislative policy area. Projected enrollment levels should serve as a guide to, rather than a determinant of, planning and budgeting. As such, there are no arguments with the statistical operations but rather with the manner in which the results are used.
4. In any new scheme the accuracy of the long range projections might be improved.
5. There is some concern for political interference with the projections.
6. Student potentials, assumptions concerning enrollment ceiling, student flows, and consideration of figures in addition to fall only should be stressed. All of these fit well with a restructuring of the role projections should play.

GROUP 3

1. The contingency fund is helpful but is no substitute for accuracy of projections. There is little disagreement with the method but rather with the manner in which they are used.
2. The demand or potential element is an appealing one, although in some ways higher education institutions are not tied closely to outside conditions. This is especially true of some student categories more than others (e.g., graduate and professional).
3. Projection of student credit hours by course level would be preferable despite its limitations. Those doing the conversions now are no better prepared to do so than any others.
4. Consideration of more than fall enrollment would be appropriate.

GROUP 4

1. The retention rate (not class succession rate) should be made explicit.
2. It would be appropriate to project total student credit hours at all schools.
3. The type and number of externally added categories could be expanded (e.g., special students).
4. Correspondence of budget and HEFC projections should be assured.
5. Provide for input to the projections from the institutions. This would bring closer agreement between the institution and the state, as well as give the institution a sense of involvement.
6. Consideration of enrollments in addition to fall is not particularly attractive or feasible. For example, peak levels are being utilized currently across the United States for facilities planning. Comparability would demand, then, that the peak be maintained whether alone or in addition to other temporal bases.
7. The contingency fund is not a satisfactory long range solution to budgeting rigidly on one figure. Perhaps a range of projections or a student potential framework with provision for enrollment ceilings, reallocation of overflows, transfers, policy inputs, and student flows would aid here.
8. Variation in the rate of college entrance by high school graduates must be treated explicitly.
9. Long range projections of up to 30 years would be desirable for planning purposes.
10. A shift in the date at which enrollments are recorded to later in the quarter/semester would render the figures more representative of actual load on the institution.
11. It would be helpful for planning to obtain figures by sex. This fits well with a potential students framework relating enrollment to population.
12. Projections, however derived, should be transmitted directly to the President of each institution for review.
13. The national and regional image of the school may have

some bearing upon enrollment trends and perhaps should be taken into account.

GROUP 5

1. Class succession relates poorly to the way students move through the system. It is much more appropriate and meaningful to talk in terms of transfers, retention and student flows.
2. A shift to student potentials and data in addition to fall quarter/semester also would be a significant improvement and would relate well to the student flow framework.
3. The comparability of projecting total student credit hours for all schools is most desirable.
4. So also is the correspondence of budget and HEFC enrollment projections.
5. Any new scheme of projections should provide for the incorporation of input, policy and otherwise, directly from the institutions. The contingency fund, will not be adequate to cover discrepancies resulting from shifts of policy.

GROUP 6

1. Provision should be made for policy inputs from the institutions.
2. Due to increased participation in the community college system, this element of higher education projections can no longer be treated implicitly. Retention of former students, the interchange of students between all types of institutions at all levels, and first-time students must be traced explicitly to do intelligent planning and budgeting.
3. The effect of artificially imposed enrollment ceilings upon trends at other institutions must be traced.
4. Class succession is a conservative projection device. Potential enrollments based upon demand would be more appropriate.
5. The addition of enrollment information beyond fall quarter/semester alone would provide a more equitable basis for fund allocation.
6. Adherence to one enrollment figure does not allow systematic planning but rather determines funding levels itself. As such, the projections set policy rather than respond to it.
7. Emphasis should be given to shifts in the proportion of graduating high school seniors going on to higher education.

It must not be assumed that the above list is exhaustive. However, these concerns as well as other issues central to the modeling of higher education and its application to the budgeting process will form the bases upon which will be constructed a preliminary scheme for projecting trends in higher education enrollment. Over the course of the current project, the scheme will be elaborated upon and tailored as closely as possible to the state system of higher education. Alteration of the scheme's precise nature will, of course, constitute a long-term process following closely, it may be hoped, the development of the phenomenon itself.

DEVELOPMENT NOTE II

REVIEW OF PAST HEFC COMPREHENSIVE PLANNING GRANT PROPOSALS AND REPORTS

The Department of Health, Education and Welfare through the Higher Education Facilities Commission (HEFC) issues grants on an annual basis for comprehensive planning. To receive a grant various organizations compile and submit proposals with a standard format for all proposals. Two sections of this proposal format are of relevance to this review. Those sections cover previous accomplishments and the intent of the study proposed. Several grant requests were examined for information relating to enrollment projections.

The results of these grants are distributed to the HEFC's through reports. All the available reports (mostly 1967 or 1968) were also examined for relevant information to our study. These reports are much more descriptive than the proposals could be. Hence, most of the procedures noted below were extracted from the methodology sections of the studies. Many reports contained no information on enrollment projections.

Three principle conceptual methods have been used for projecting enrollment as noted in the past HEFC Comprehensive Planning reports. These are **1)** simple ratios or percentages, **2)** regression or least squares, and **3)** cohort survival or class succession. Each of these principal methods was treated in slightly different ways in the various states and in some cases two of the above methods were combined to produce enrollment projections.

Simple ratios or percentages as the principle method were reported by two states (Illinois and Virginia). Illinois applied a projected enrollment ratio to the projected state population. Virginia projected the 1960 18-21 age group to 1985 by aging and applied percentages to generate enrollment projections.

Regression was the primary method applied for projections in three states (Indiana, Minnesota, and West Virginia). Indiana used regression to determine various age groups in college as a function of time. Minnesota applied least squares procedures for five basic equations. All equations covered some of the following variables; high school graduates, military, new freshmen and time with a time lag in some cases. The functions used were linear and logarithmic in addition to certain coefficients that were nonlinear in time. West Virginia used cohort survival to generate high school graduates, however, regression was then used with high school graduates as one of the principle variables.

Cohort survival was used by three states (California, Iowa, and Oregon). California used class succession for its ten-year projection. In Iowa a consultant applied cohort survival with adjustments to the base data to reflect certain changes. Oregon indicated use of cohort survival methods.

In some cases the grant proposal had no accompanying report or the report was not due at this time. Two states had interesting proposals. California in their June, 1968 grant indicated a "... study to initiate a more comprehensive and sophisticated method of predicting enrollment for all institutions of public and private higher education ..." over three time periods: **1)** 1-10 years, **2)** 11-15 years, and **3)** 20-30 years. A telephone response was to the effect that population was being projected to small areas for use in these predictions. Rhode Island was planning to project population, school enrollment, and junior college enrollment out 20 years. Also, they would predict those junior college students who would have otherwise attended four-year institutions in addition to junior college transfers to four-year institutions. No followup has been made on this study proposal of June, 1967.

This review has been brief but to the point. If more detail is required for any purpose the documents are referenced. It should be noted that most of the states applied their analysis on a small area basis, i.e., counties. Hence, a measure of population served by county is sometimes available. Some states exhibited very little or no migration (Indiana, Virginia). A final point is that the reports are comprehensive planning grant reports and do not always devote extensive documentation to enrollment projection methodology, in fact, some do not even mention enrollment projections.

APPENDIX C

Enrollment Data Collection Forms

Included in this appendix are two items: One, the data collection form for the **HEEP** Model to be used in the fall of 1970; and two, a recommended additional questionnaire to be used by all institutions in the fall of 1971 in order to define the status of students the previous fall term. All data collection efforts indicated most institutions could not definitely determine the status of all students the previous fall term. This recommended questionnaire should help the institutions to adequately define student status the previous fall.

_____
Name of Institution

HIGHER EDUCATION
ENROLLMENT PROJECTION

REPORTING FORMS
Fall Term, 1970

Please complete and return
these forms by no later than:

October 26, 1970

to: Office of Program Planning &
Fiscal Management
Population & Enrollment Section
Insurance Building
Olympia, Washington 98501

This report was completed by:
(or under the direction of)

_____
Name

_____
Title

_____
Date

INSTRUCTIONS FOR COMPLETION OF TABLES 1-6

Note 1 – Students

Students are defined as all academic students enrolled for at least one credit in on-campus courses at the end of the second week of instruction of the fall term. Students *not* included in this definition are:

a) Correspondence students (students enrolled in courses conducted by mail).

b) Pupils in nursery, elementary or special children's classes, even if operated by the college or university.

c) Students who are registered either in non-credit courses, in non-academic credit courses, or for no credit in academic courses.

d) Students who are registered for courses at branch institutions or centers not on the home campus.

The following credit hour categories are to be used to classify students by class:

Quarter System		Semester System	
Freshman	0 - 44	Freshman	0 - 29
Sophomore	45 - 89	Sophomore	30 - 59
Junior	90 - 134	Junior	60 - 89
Senior	135 & over	Senior	90 & over

If the system used at this institution is different from either a quarter or semester system, please allocate students in a manner that approximates the above categories.

Graduate students are defined as all students meeting the criteria for inclusion in Table 1 who are enrolled in a program for an advanced degree (Master's, Doctor's).

Professional students are defined as all students meeting the criteria for inclusion in Table 1 who are enrolled in first professional degree programs requiring three or more years of previous college work for entry (J.D., D.D.S., M.D., D.V.M., B.D.).

Other includes all students meeting the above criteria but not classifiable to any other specified category. Examples of students included in this category are:

a) Students with a Bachelor's degree but not working for a specified degree or certificate.

b) Students working for a standard teaching certificate or principal's credentials.

c) Students working for a second Bachelor's degree.

d) Non-matriculated students.

e) Unclassified 5 students.

Note 2–Transfers

Transfer students are defined as all students meeting the criteria for inclusion in Table 1 who are registered at this institution, transferring college level credits from some other institution, and were registered for credit the previous fall term at some other institution. Students excluded from this definition are those students returning from the previous fall term.

Out-of-state is defined as students who were registered in the fall term of the preceding academic year in an institution located outside the State of Washington.

In-state is defined as students who were registered in the fall term of the preceding academic year in an institution in the State of Washington.

Note 3 – Retention

Returning students are defined as all students meeting the criteria for inclusion in Table 1, except graduate, professional and other, who were enrolled at your institution in the fall term of the specified year and were also

enrolled at your institution in the fall term of the preceding year. For example, "Total returned in 1970 from 1969 enrollment," includes all students enrolled in fall term 1970 who were also enrolled at your institution in fall term, 1969. "1969 enrollment" includes all students enrolled at your institution in 1969 meeting the criteria for Table 1, except graduate, professional and other.

Note 4 — Entrances

An **entering student** is defined as a student meeting the criteria for inclusion in Table 1 who did *not* attend a higher educational institution the previous fall. Students excluded from this definition are returning students and transfer students as defined in notes 2 and 3.

High school graduate is defined as a student who graduated from a high school in the State of Washington during the preceding academic year.

Military is defined as a student who was in the military service during the fall term of the preceding academic year.

Out-of-state is defined as a student whose residence during the fall term of the preceding academic year was outside the State of Washington and was not registered for credit in any higher educational institution. A non-resident tuition fee criteria may be used if applicable at this institution.

All other is defined as students not elsewhere classifiable and located in the State of Washington during the previous academic year. Examples of students included in this category are:

a) Students who were in the labor force during the fall term of the preceding academic year.

b) Students who were housewives during the fall term of the preceding academic year.

Note 5 — Credit Hours, Residents

For Table 5, students are defined as all students meeting the criteria for inclusion in Table 1. Total student credit hours for which the students defined above are registered should be entered in this table for each class (freshman, sophomore, junior, senior, graduate, professional, and other). This table also requests the number of Washington State residents among students as defined above.

Note 6 — Special Categories

Table 6 requests *enrollments* for certain special categories of student as defined below, and *projections* of these special categories for future years. The projections should reflect the best current planning of this institution regarding these categories of students.

Graduate, Professional, and **Other** students are defined in the same manner as these categories were defined for inclusion in Table 1.

Off-campus students are defined as students who are registered for courses at branch institutions or centers not on the home campus. These students have *not* been included in any of the definitions used for Tables 1 through 5 of this data request. Correspondence students are *not* included in this definition.

Please include a short description of the methods used to project these special categories of students or other comments that would be helpful in understanding these projections.

TABLE 1

STUDENTS BY AGE AND CLASS STANDING*

YEAR 1970

AGE	TOTAL	FRESH.	SOPH.	JUNIOR	SENIOR	GRAD.	PROFS.	OTHER*
TOTAL								
Under 18								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30 & over								
NOT INDICA								

* See Note 1 of Instructions.

TABLE 2

TRANSFER STUDENTS BY SOURCE AND CLASS*

YEAR 1970

INSTITUTION WHERE REGISTERED THE PREVIOUS FALL TERM	CLASS Fresh.	Soph.	Junior	Senior	Grad.	Profs.	Other
TRANSFERS FROM							
Out-of-State Institutions							
WASHINGTON UNIVERSITIES							
Univ. of Washington							
Washington State Univ.							
WASHINGTON STATE COLLEGES							
Central Wash. State College							
Eastern Wash. State College							
Western Wash. State College							
WASHINGTON PRIVATE INSTITUTIONS							
Ft. Wright College							
Gonzaga University							
Northwest College							
Pacific Lutheran Univ.							
St. Martins College							
St. Thomas Seminary							
Seattle Pacific College							
Seattle University							
Univ. of Puget Sound							
Walla Walla College							
Whitman College							
Whitworth College							
WASHINGTON COMMUNITY COLLEGES							
Peninsula							
Grays Harbor							
Olympic							
Skagit Valley							
Edmonds							
Everett							
Seattle							
Shoreline							
Bellevue							
Highline							
Green River							
Ft. Steilacoom							
Centralia							
Lower Columbia							
Clark							
Wenatchee							
Yakima							
Spokane							
Big Bend							
Columbia Basin							
Walla Walla							
Tacoma							
Whatcom							

* See Note 2 of Instructions

TABLE 3

RETENTION OF STUDENTS

IN PAIRS OF ACADEMIC YEARS*

1969 - 1970

Class in fall of 1969 Academic Year	1969 Total	Total Returned in 1970			
		Freshman	Sophomore	Junior	Senior
Freshman					
Sophomore		N.A.			
Junior		N.A.	N.A.		
Senior		N.A.	N.A.	N.A.	

* See Note 3 of instructions

TABLE 4

ENTERING STUDENTS

BY SOURCE

YEAR 1970

ENTRANCES FROM HIGH SCHOOL

County of High School Graduation	Number of Students	County of High School Graduation	Number of Students
Adams		Lewis	
Asotin		Lincoln	
Benton		Mason	
Chelan		Okanogan	
Clallam		Pacific	
Clark		Pend Oreille	
Columbia		Pierce	
Cowlitz		San Juan	
Douglas		Skagit	
Ferry		Skamania	
Franklin		Snohomish	
Garfield		Spokane	
Grant		Stevens	
Grays Harbor		Thurston	
Island		Wahkiakum	
Jefferson		Walla Walla	
King		Whatcom	
Kitsap		Whitman	
Kittitas		Yakima	
Klickitat		TOTAL	

OTHER ENTRANCES

	TOTAL	FRESHMAN	SOPHOMORE	JUNIOR	SENIOR
High School			N.A.	N.A.	N.A.
Out-of-State					
All Other					
Military					
Total					

* See Note 4 of instructions.

TABLE 5

TOTAL STUDENT CREDIT HOURS AND

WASHINGTON STATE RESIDENTS BY CLASS STANDING*

Class Standing	Student Credit Hours
TOTAL	
Freshman	
Sophomore	
Junior	
Senior	
Graduate	
Professional	
Other	

Class Standing	Wash. State Resident
TOTAL	
Freshman	
Sophomore	
Junior	
Senior	
Graduate	
Professional	
Other	

* See Note 5 of instructions

TABLE 6

PROJECTIONS OF SPECIAL CATEGORIES OF STUDENTS*

Year	Graduate	Professional	Off Campus	Other
1965				
1966				
1967				
1968				
1969				
1970				
1971				
1972				
1973				
1974				
1975				
1976				
1977				

* See Note 6 of instructions

DESCRIPTION OF PROJECTION METHODOLOGY:

SUGGESTED NEW DATA ITEM – COMMUNITY COLLEGES

WHERE WERE YOU DURING OCTOBER OF LAST YEAR?

If you were enrolled in a university or college, please specify only one:

___Enrolled in this community college.

___Enrolled in some other community college.
Please specify. _____

___Enrolled in a four-year university or college.
Please specify. _____

If you were not enrolled in a university or college, please specify only one:

___Enrolled in a high school in the State of Washington.

___Serving in the Armed Forces.

___Living in the State of Washington.
Please specify county of residence. _____

___Living outside of the State of Washington.

SUGGESTED NEW DATA ITEM – FOUR-YEAR COLLEGES

WHERE WERE YOU DURING OCTOBER OF LAST YEAR?

If you were enrolled in a university or college, please specify only one:

___Enrolled in this college.

___Enrolled in a community college.
Please specify. _____

___Enrolled in some other four-year university or college.
Please specify. _____

If you were not enrolled in a university or college, please specify only one :

___Enrolled in a high school in the State of Washington.

___Serving in the Armed Forces.

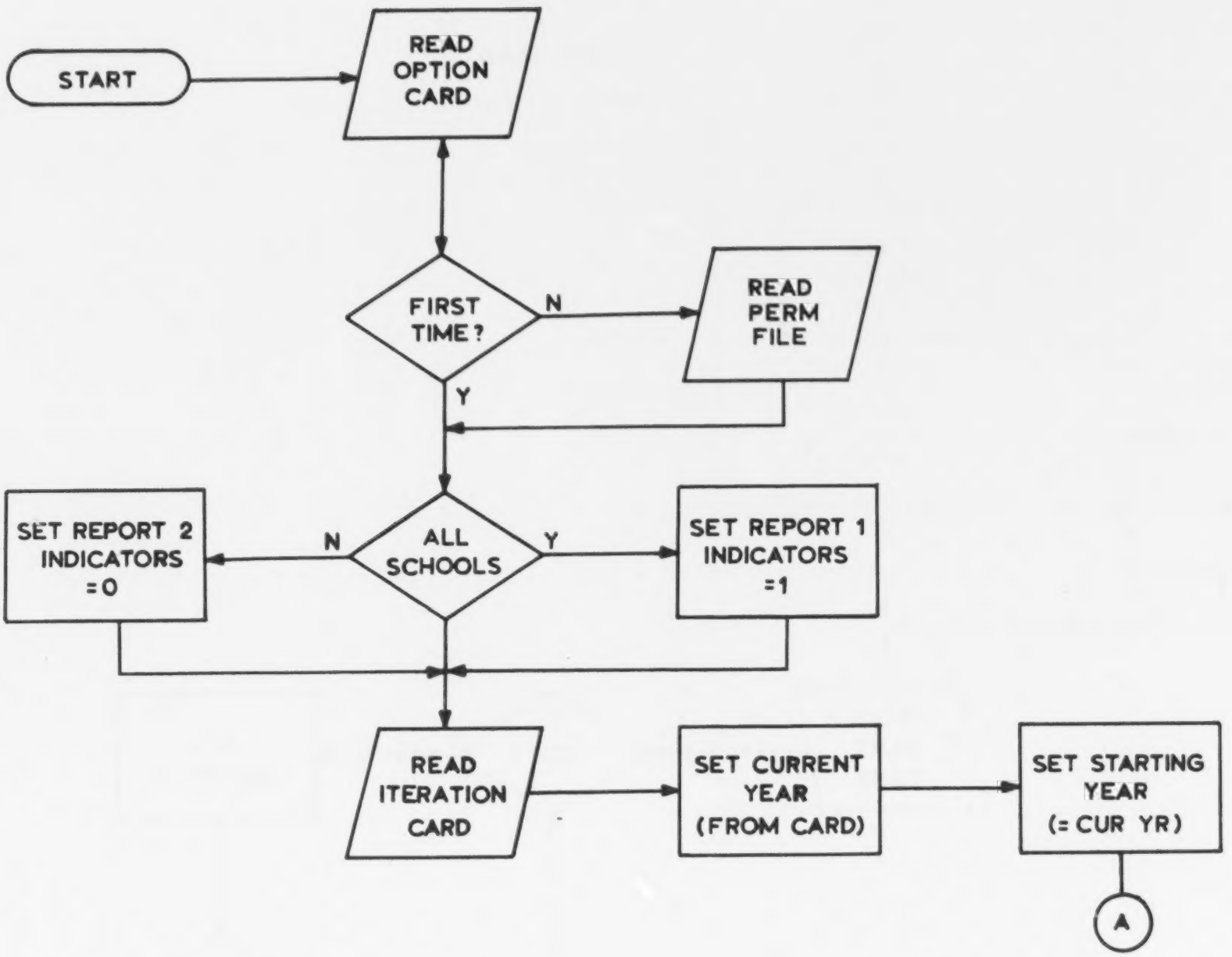
___Living in the State of Washington.
Please specify county of residence. _____

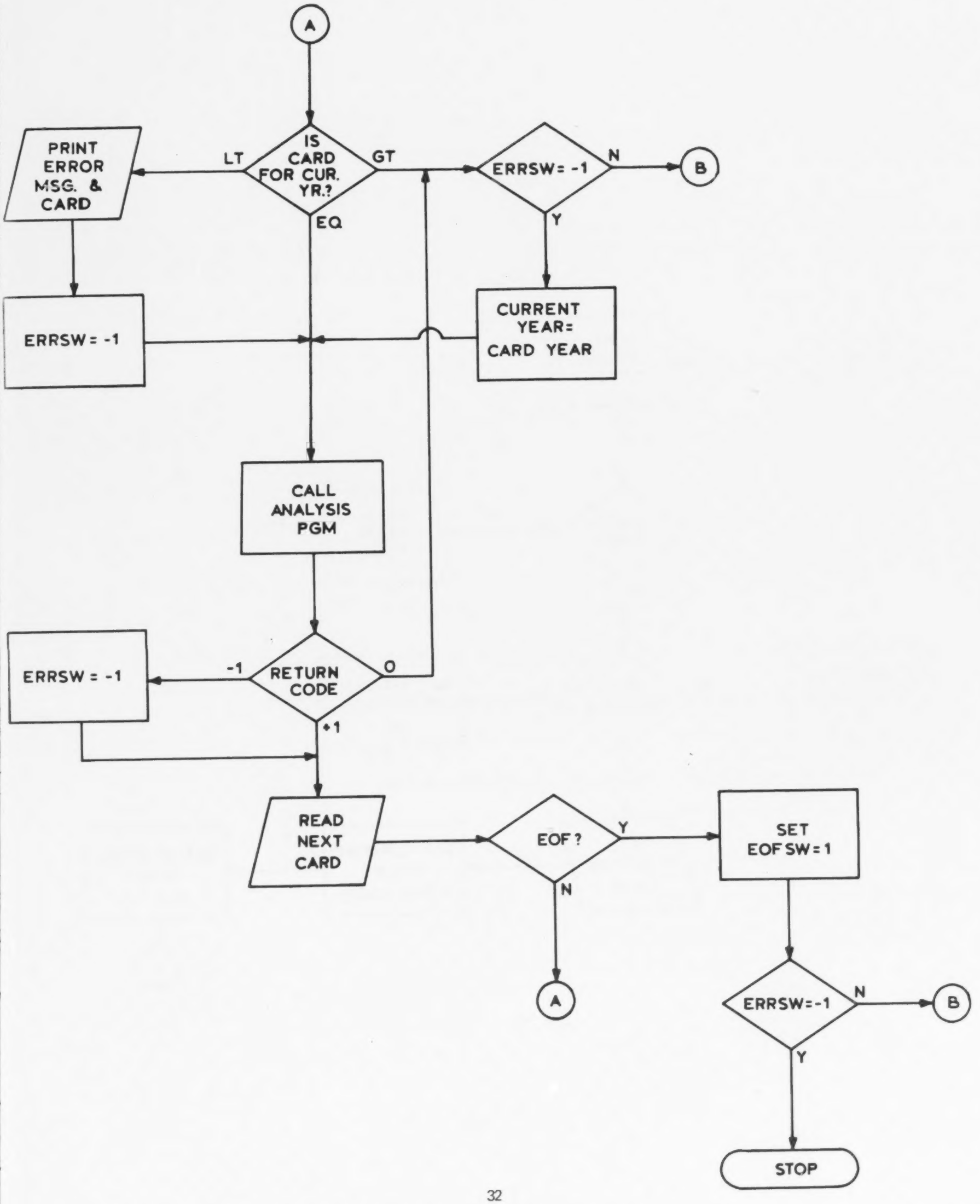
___Living outside of the State of Washington.

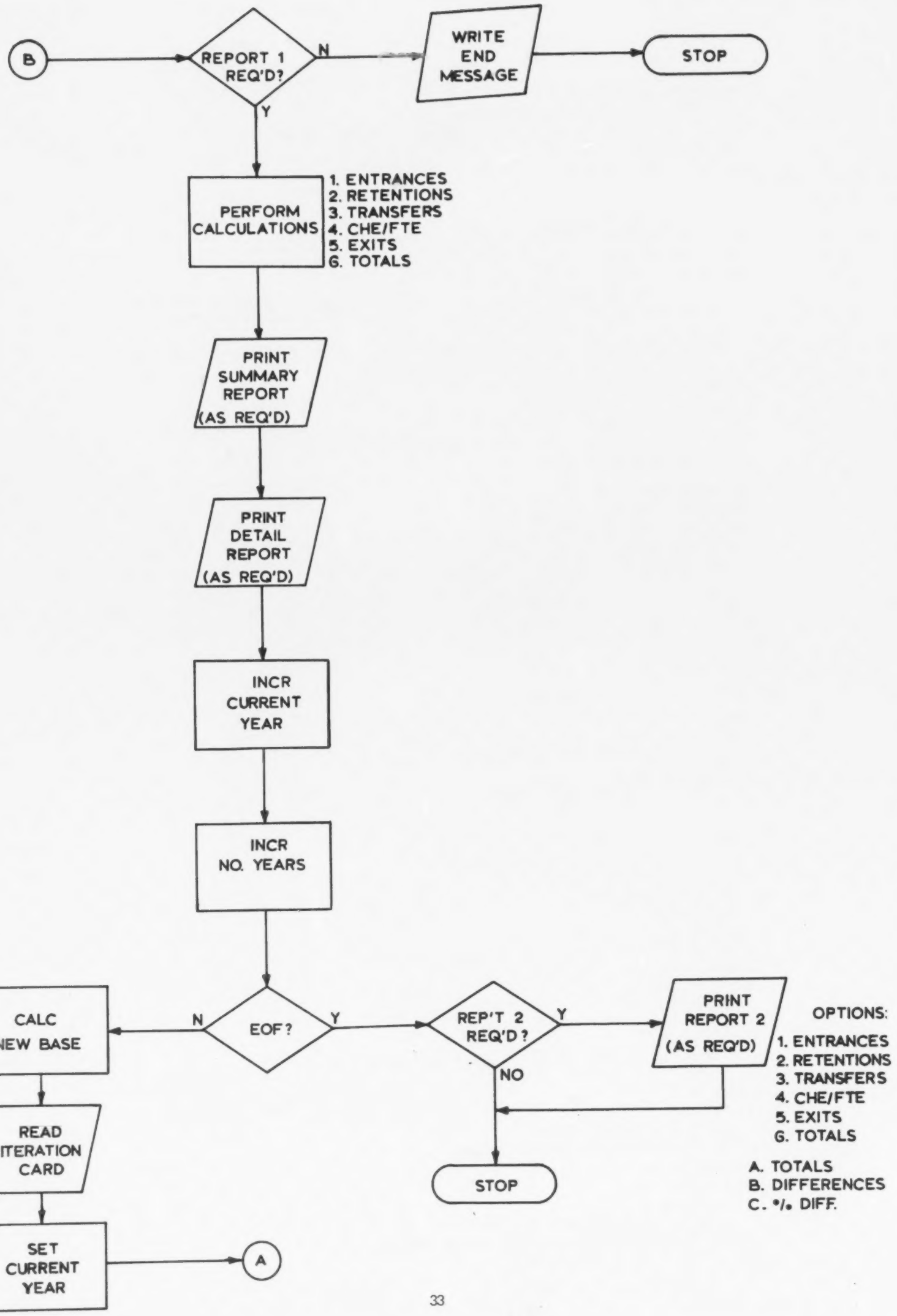
APPENDIX D

HEEP Model Computer Program

The program that follows is the latest version of the model as reported in the text. The model will undergo continuous revisions as problems are solved and incorporated. The current version of the program operates within 102K core and utilizes about 3 minutes of CPU time to process all schools for 5 years on a 360/50 operating under OS/MFT.


START
READ OPTION CARD
FIRST TIME?
N
Y
READ PERM FILE
SET REPORT 2 INDICATORS =0
N
ALL SCHOOLS
Y
SET REPORT 1 INDICATORS =1
READ ITERATION CARD
SET CURRENT YEAR (FROM CARD)
SET STARTING YEAR (= CUR YR)
A


A
IS CARD FOR CUR. YR.?
LT
GT
EQ
PRINT ERROR MSG. & CARD
ERRSW = -1
ERRSW= -1
N
B
Y
CURRENT YEAR= CARD YEAR
CALL ANALYSIS PGM
RETURN CODE
-1
0
+1
ERRSW = -1
READ NEXT CARD
EOF ?
Y
N
SET EOF SW = 1
A
ERRSW=-1
N
B
Y
STOP


B
REPORT 1 REQ'D?
N
Y
WRITE END MESSAGE
STOP
PERFORM CALCULATIONS
1. ENTRANCES
2. RETENTIONS
3. TRANSFERS
4. CHE/FTE
5. EXITS
6. TOTALS
PRINT SUMMARY REPORT (AS REQ'D)
PRINT DETAIL REPORT (AS REQ'D)
INCR CURRENT YEAR
INCR NO. YEARS
CALC NEW BASE
N
EOF?
Y
REP'T 2 REQ'D?
Y
NO
PRINT REPORT 2 (AS REQ'D)
OPTIONS:
1. ENTRANCES
2. RETENTIONS
3. TRANSFERS
4. CHE/FTE
5. EXITS
6. TOTALS
A. TOTALS
B. DIFFERENCES
C. % DIFF.
READ ITERATION CARD
STOP
SET CURRENT YEAR
A

```
0001                  INTEGER*2       RPTREQ    , RPTALL, RPTSUM, RPTDET
0002                  INTEGER*2       RTOT, RENTR, RRET, RXFER, REXIT, RCHE,
                     1                RTOTL, RDIFF, RPERC, REPRT1,REPRT2
0003                  INTEGER *2 RTYPE,RIDNT
0004                  INTEGER * 2 DRN(4),MON,JDAY,JYR
0005                  INTEGER SENT, SRET, SXFR, SEXIT, SCHE, STOT
0006                  INTEGER SS
0007                  REAL*8 SCHL,RHEAD(5),BLNK
0008                  REAL*8           TIME,JDATE,DTRN(1)
                C
0009                  COMMON /CALDAT/MON,JDAY,JYR
0010                  COMMON /INOUT/ ITTL,IENT,IRET,IXER,IEXT,ICHE
0011                  COMMON /NUMSCH/ I4YR, ICC, I4YRCL, ISCHL,ICLTOT
0012                  COMMON / OPT/ ITEMP, IFRST,IYEAR
0013                  COMMON /RPT1/  RPTREQ(45),RPTALL, RPTSUM, RPTDET, REPRTA
0014                  COMMON /RPT2 /  RTOT, RENTR, RRET, RXFER, REXIT, RCHE,
                     1                RTOTL, RDIFF, RPERC
0015                  COMMON /SUMTOT/ SENT(105),SRET(105),SXFR(105),SEXIT(105),
                     1                SCHE(105),STOT(105)
0016                  COMMON /SCHNME/SCHL(2,46)
                C
0017                  DIMENSION REPRT1(48), REPRT2(9), VALUE(14),SHEAD(3,14)
0018                  DIMENSION FADD(12,20),AVAL(14),XFROUT(46)
0019                  DIMENSION SS(105,6)
                C
0020                  EQUIVALENCE (SS(1,1), SENT(1))
0021                  EQUIVALENCE (DRN(1),DTRN)
0022                  EQUIVALENCE (REPRT1(1),RPTREQ(1))
0023                  DATA RHEAD    /40H  TOTAL   HI-SCH  MIL      IN-ST  OUT-ST   /
0024                  DATA SHEAD     /12HENTRANCES   ,12HRETENTIONS  ,12HTRANSFERS   ,
                     1                 12H 4-YR COLL  ,12H COMM COLL  ,12H TOTAL      ,
                     2                 12HTOTALS      ,12HSTU. ADD-ON ,12HSTU. TOTAL  ,
                     3                 12HCHE. ADD-ON ,12HCHE. TOTAL  ,12HEXITS       ,
                     4                 12HRESIDENTS   ,12HNON-RES     /
0025                  DATA BLNK/'          '/
              C
0026                  DEFINE FILE 8 (2280,15,U,IV)
              C           SET NUMBER OF 4YR SCHOOL.
0027                  I4YR =20
              C           SET NUMBER OF COMM COLL.
0028                  ICC = 25
              C           CALC. TOTAL SCHOOLS.
0029                  ISCHL = I4YR + ICC
              C           CALC. TOTAL 4YR CLASSES
0030                  I4YRCL= 4 *I4YR
              C           CALC. TOTAL SCHOOL-CLASSES.
0031                  ICLTOT= I4YRCL + ICC
              C           I/O DEVICES
0032                  ICARD= 16
0033                  IPRT = 6
0034                  IENT = 10
0035                  IRET = 11
0036                  IXER = 12
0037                  IEXT = 13
0038                  ICHE = 14
0039                  ITTL = 15
              C           END OF INPUT (CARD) FILE SW (EOF=1).

0041                  NYRS = 1
0042                  IERR =0
              C           GET CALENDAR DATE
0043                  CALL TIMEDA(TIME,JDATE,DTRN)
0044                  MON=DRN(2)
0045                  JDAY=DRN(3)
0046                  JYR=DRN(1)
              C           READ PRINT OPTION CARD.
0047                  CALL PRNTOP(ITEMP,IFRST,ISCHL,FADD)
              C           GET ITERATION CARD
```

```
0048                  READ(ICARD,9010)          IYR, RTYPE,RIDNT, ISCH, VALUE,AVAL
0049                  IYEAR = IYR
0050           120    CONTINUE
               C          CHECK CARD AGAINST CURRENT YEAR.
0051                  IF (IYR- IYEAR) 130,140,220
0052           130    CONTINUE
               C          ERROR--CARD OUT OF ORDER.
0053                  WRITE (IPRT,9020)IYEAR,IYR,RTYPE,RIDNT,ISCH,VALUE
0054                  IERR=-1
0055                  IYEAR = IYR
0056           140    CONTINUE
0057                  CALL ANALIZ (IYR, RTYPE,RIDNT,ISCH , VALUE, AVAL,FADD, IRTN)
               C            CHECK FOR RETURN CODE.
               C              -1=ERROR
               C              0=NORMAL RETURN,READ NEXT CARD
               C              1=BLANK CARD, PROCESS.
0058                  IF (IRTN) 150,200,220
               C          ERROR CONDITION. READ OTHER INPUT - DO NOT PROCESS.
0059           150    IERR=-1
               C          GET NEXT ITERATION CARD
0060           200    READ(ICARD,9010, END=210) IYR, RTYPE,RIDNT, ISCH, VALUE,AVAL
0061                  GO TO 120
               C          SET EOF SWITCH.
0062           210    IEOF =1
0063                  IF (IERR .EQ. -1) STOP
0064                  IF (IYR .LT. IYEAR) GO TO 260
               C          PROCESS CURRENT YEAR IF NO ERROR
0065           220    CONTINUE
0066                  IF (IERR .EQ. -1) GO TO 225
0067                  IF(NYRS .NE. 1) GO TO 221
               C          PRINT RATE REPORTS
0068                  CALL RATREP(SCHL,IFRST)
               C         CHECK SUMMARY   REPORT REQ'D.
0069           221    CONTINUE
0070                  DO 222 I=1,ISCHL
0071                  IF (REPRT1 (I) .NE. 0) GO TO 226
               C          NO REPORTS REQUESTED
0072           222    CONTINUE
0073                  WRITE (IPRT,9040)
0074                  STOP
               C          ERROR EXISTS. UPDATE CURRENT YEAR AND READ CARDS
0075           225    CONTINUE
0076                  IYEAR=IYR
0077                  GO TO 200
               C          PROCESS ARRAYS
0078           226    CONTINUE
0079                  CALL ARAPRO(IYEAR,FADD,ICLTOT,XFROUT,I4YR)
               C          PREPARE REPORTS - 4 YEAR & COMM COLL.
0080           230    CONTINUE
0081                  CALL RPTGEN(ISCHL,FADD,XFROUT,IYEAR,RHEAD,SHEAD,ITEMP)
0082           250    CONTINUE
0083                  IF(ITEMP.EQ.1.AND.NYRS.EQ.1) CALL WRCOM
               C          INCREMENT CURRENT YEAR.
0084                  IYEAR=IYEAR+1
0085                  NYRS = NYRS +1
               C          CHECK EOF
0086                  IF (IEOF .NE. 0) GO TO 260
               C          CALCULATE NEW BASE
0087                  CALL NEWBAS
0088                  IF (IRTN.EQ.1) GO TO 200
0089                  GO TO 120
               C          CHECK 'ALL' SWITCH.
0090           260    CONTINUE
0091                   IF (RPTALL .EQ. 0) STOP
               C            PREPARE FINAL REPORT
0092                   CALL SUMREP(NYRS,ITEMP)
               C
0093           9010 FORMAT (I4,1X,2A1,I3,14F5.0, T11,14(1X,A4))
0094           9020 FORMAT (1HO,'**** ERROR--CARD OUT OF ORDER.  CURRENT YEAR=',I5
                   1       /1H ,'     LAST CARD WAS ',2X,I4,1X,2A1,I3,14F5.0)
```

```
0095          9040  FORMAT (1H0,'***  ITERATION NOT REQUIRED FOR THIS RUN.')
0096                STOP
0097                END
```



```
0001                SUBROUTINE ANALIZ (IYR,RTYPE,RIDNT,ISCH,VALUE,AVAL,FADD,CODE)
                C       ROUTINE TO ANALIZE EACH DATA CARD AND CALL THE APPROPRIATE
                C       ROUTINE TO PROCESS IT.
0002                COMMON /BASCOM/ BASE(4),BAS4YR(4,20),BASCC(25)
0003                REAL*4 VALUE(14),AVAL(14),FADD(12,20)
0004                REAL*4 BL4
0005                INTEGER*4 CODE
0006                INTEGER*2 RTYPE,RIDNT,BL,B
0007                INTEGER*2 TYPE(4),IDNT(3)
0008                DATA BL/'  '/,B/'B '/
0009                DATA BL4/'    '/
0010                DATA TYPE    / 'C','R','A','M'/
0011                DATA IDNT /'E','R','T'/
0012                CODE = 0
                C       CHECK IF CARD IS ITERATION CARD ONLY.
0013                IF (RTYPE.NE.BL) GO TO 100
0014                IF (RIDNT.NE.BL) GO TO 900
0015                CODE = 1
0016                GO TO 1000
0017              100 CONTINUE
                C       CHECK IF BASE/ENTRANCE CARD - E  OPTIONAL
0018                IF (RTYPE.EQ.B) GO TO 600
                C       CHECK IF SCHOOL NUMBER IS REASONABLE.
0019                IF ( ISCH.LT.1.OR.ISCH.GT.105 ) GO TO 900
0020                IF ( ISCH.LE.25 ) GO TO 120
                C       CHECK THAT 4YR SCHOOL NUMBER IS FOR FRESH CLASS
0021                IF (ISCH-26-(((ISCH-26)/4)*4).NE.0) GO TO 900
0022              120 CONTINUE
0023                DO 130 I = 1,4
0024                K = I
0025                IF (TYPE(I).EQ.RTYPE) GO TO 140
0026              130 CONTINUE
0027                GO TO 900
0028              140 GO TO (200,250,300,450),K
0029              200 CONTINUE
                C       INDICATES CELL CARD, NOW CHECK IF E,T OR R MATRIX.
0030                DO 210 I = 1,3
0031                K = I
0032                IF (IDNT(I).EQ.RIDNT) GO TO 220
0033              210 CONTINUE
0034                GO TO 900
0035              220 GO TO (225,230,235),K
0036              225 CONTINUE
                C       INDICATES CELL CARD FOR ENTRANCE MATRIX.
0037                CALL CRUPDT (ISCH,VALUE,AVAL)
0038                GO TO 1000
0039              230 CONTINUE
                C       INDICATES CELL CARD FOR RETENTION MATRIX.
0040                CALL CRUPDT(ISCH,VALUE,AVAL)
0041                GO TO 1000
0042              235 CONTINUE
                C       INDICATES CELL CARD FOR TRANSFER MATRIX.
                C       CHECK IF FROM AND TO SCHOOL ARE THE SAME.
0043                IVAL     = VALUE(5)
0044                IF (ISCH.EQ.IVAL    ) GO TO 900
0045                CALL CTUPDT (IYR,RTYPE,RIDNT,ISCH,VALUE,AVAL,CODE)
0046                GO TO 1000
0047              250 CONTINUE
                C       INDICATES RATE CARD NOW CHECK IF E,T OR R MATRIX.
0048                DO 260 I = 1, 3
0049                K= I
0050                IF (IDNT(I).EQ.RIDNT) GO TO 270
0051              260 CONTINUE
```

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FORTRAN IV G LEVEL 1, MOD 4            ANALIZ            DATE = 70298          03/30/23
 0052                GO TO  900
 0053              270 GO TO (275,280,285),K
 0054              275 CONTINUE
                C      INDICATES RATE CARD FOR ENTRANCE MATRIX.
 0055                CALL REUPDT (ISCH,VALUE,AVAL)
 0056                GO TO 1000
 0057              280 CONTINUE
                C      INDICATES RATE CARD FOR RETENTION MATRIX.
                C      CHECK THAT NO BASE VALUES ENTERED ON RATE CARDS.
 0058                DO 282 I = 1,4
 0059                IF (VALUE(I).NE.0) GO TO 900
 0060              282 CONTINUE
 0061                CALL RRUPDT (ISCH,VALUE,AVAL)
 0062                GO TO 1000
 0063              285 CONTINUE
                C      INDICATES RATE CARD FOR TRANSFER MATRIX
                C      CHECK IF FROM AND TO SCHOOL IS THE SAME
 0064                IVAL     = VALUE(5)
 0065                IF (ISCH.EQ.IVAL    ) GO TO 900
 0066                CALL RTUPDT (IYR,RTYPE,RIDNT,ISCH,VALUE,AVAL,CODE)
 0067                GO TO 1000
 0068              300  CONTINUE
                C      INDICATES ADD ON CARD FOR SPEC ,GRAD,PROF STUDENTS.
                C       CHE ADDONS,CHE RATIOS AND RES RATIOS
                C      ASSUME DEC POINT IN CARD
 0069                IF (ISCH.LE.25) GO TO 900
 0070                ISH = (ISCH-22)/4
 0071                DO 320 I = 1,12
 0072                IF(AVAL(I) .EQ. BL4) GO TO 320
 0073                FADD(I,ISH) = VALUE(I)
 0074              320 CONTINUE
 0075                GO TO 1000
 0076              450 CONTINUE
                C      INDICATES MAX VALUE
                C
                C         CALL PROMAX
                C
 0077                GO TO 1000
 0078              600 CONTINUE
                C      INDICATES  BASE CARD. FOR HI-SC,MIL,IN-ST,OUT-ST.
 0079                DO 610 I=1,4
 0080                IF (AVAL(I).EQ.BL4)GO TO 610
 0081                BASE(I)= VALUE(I) *100.
 0082              610 CONTINUE
 0083                IF(AVAL(4).NE.BL4)GO TO 620
 0084                BASE(4) = BASE(3)
 0085              620 CONTINUE
 0086                GO TO 1000
 0087              900 CONTINUE
                C      ERROR CODE FOLLOWS
 0088                CODE = -1
 0089                WRITE (6,999) IYR,RTYPE,RIDNT,ISCH,VALUE
 0090              999 FORMAT('0',I4,1X,2A1,I3,14F7.0,' CARD ERROR')
 0091             1000 CONTINUE
 0092                RETURN
 0093                END
FORTRAN IV G LEVEL 1, MOD 4            ARAPRO            DATE = 70288          03/30/23

 0001                SUBROUTINE ARAPRO(IYEAR,FADD,ICLTOT,XFROUT,I4YR)
 0002                INTEGER SENT, SRET, SXFR, SEXIT, SCHE, STOT
 0003                INTEGER*2        RTOT, RENTR, RRET, RXFER, REXIT, RCHE,
                    1                RTOTL, RDIFF, RPERC, REPRT1,REPRT2
 0004                COMMON /RPT2 /   RTOT, RENTR, RRET, RXFER, REXIT, RCHE,
                    1                RTOTL, RDIFF, RPERC
 0005                COMMON /SUMTOT/ SENT(105),SRET(105),SXFR(105),SEXIT(105),
                    1                SCHE(105),STOT(105)
 0006                COMMON /INOUT/ ITTL,IENT,IRET,IXFR,IEXT,ICHE
 0007                DIMENSION XFROUT(46),FADD(12,20)
 0008                CALL ENTRNC (SENT ,IENT, IYEAR,RENTR)
                C
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0009                CALL RETEN  (SRET ,IRET, IYEAR,RRET)
                C
0010                CALL TRNFR  (SXFR ,IXFR, IYEAR,RXFR,XFROUT)
                C
0011                CALL CHEFTF (SCHF ,ICHF, IYEAR,I4YR  , RCHF,FADD)
                C
0012                CALL EXTS (IEXT,IYEAR,       REXIT,XFROUT)
                C
0013                CALL TOT (ITTL,IYEAR,ICLTOT,RTOT)
                C
0014                RETURN
0015                END
```



```
0001                SUBROUTINE  CEUPDT (ISCH,VALUE,AVAL)
                C   ROUTINE TO UPDATE ENTRANCE CELL MATRIX.
0002                COMMON /ENTCOM/ ENTRAT(4,105),ENTCEL (4,105)
0003                COMMON /OLDRAT/ OLDRE(105),OLDRR(105),OLDRT(2070)
0004                COMMON /BASCOM/ BASE(4),BAS4YR(4,20),BASCC(25)
0005                LOGICAL*1 OLDRE,OLDRR,OLDRT
0006                REAL * 4  VALUE(14),AVAL(14),SAVE(14),BL
0007                DATA BL/'    '/
0008                IMAT = 1
0009                GO TO 25
0010                ENTRY       REUPDT (ISCH,VALUE,AVAL)
                C   ROUTINE TO UPDATE ENTRANCE RATE MATRIX.
0011                IMAT = -1
0012             25 CONTINUE
0013                OLDRE(ISCH) = .TRUE.
0014                DO 26 I = 1,14
0015                SAVE (I)= -9.
0016             26 CONTINUE
0017                IF (ISCH.GT.25) GO TO 100
                C   UPDATE ELEMENT FOR CC
0018                DO 50 I = 1,4
0019                IF (AVAL(I).EQ.BL) GO TO 50
0020                SAVE (I) = ENTRAT (I,ISCH)
0021                IF (IMAT) 40 , 40 , 30
0022             30 CONTINUE
0023                ENTCEL(I,ISCH) = VALUE (I)
0024                IF(BASE(I) .NE. 0.0) GO TO 35
0025                ENTRAT(I,ISCH)= 0.0
0026                GO TO 50
0027             35 CONTINUE
0028                ENTRAT(I,ISCH) = VALUE (I)/ BASE(I)
0029                GO TO 50
0030             40 CONTINUE
0031                ENTRAT (I,ISCH) = VALUE (I)
0032             50 CONTINUE
0033                GO TO  200
0034            100 CONTINUE
0035                K = 0
0036                ISH = ISCH-1
0037                DO 150 J = 1,4
0038                DO 150 I = 1,4
0039                IF (I.EQ.1.AND.J.NE.1) GO TO 150
0040                K = K + 1
0041                IF (AVAL (K).EQ.BL) GO TO 150
0042                SAVE (K) = ENTRAT(I,J+ISH)
0043                IF (IMAT) 120,120, 110
0044            110 CONTINUE
0045                ISH1 = (ISH-22)/4
0046                ENTCEL (I,J+ISH) = VALUE(K)
0047                IF(BASE(I) .NE. 0.0) GO TO 115
0048                ENTRAT(I,J+ISH) =0.0
0049                GO TO 150
0050            115 CONTINUE
0051                ENTRAT (I,J+ISH) = VALUE(K) / BASE(I)
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FORTRAN IV G LEVEL 1, MOD 4            CEUPDT          DATE = 70288          03/30/23

0052                GO TO 150
0053             120 CONTINUE
0054                ENTRAT (I,J) = VALUE (K)
0055             150 CONTINUE
0056             200 CONTINUE
0057                IREC = ISCH
0058                WRITE (8'IREC) ISCH,SAVE
0059                RETURN
0060                END
FORTRAN IV G LEVEL 1, MOD 4            CHEETE          DATE = 70288          03/30/23

0001                SUBROUTINE CHEETE (SCHE, IODV, IYEAR,I4YR,  RCHE,ADDONS)
                C          ROUTINE TO PREPARE THE CHE-ETE INFO FOR FINAL REPORT.
0002                INTEGER * 2 RCHE
0003                INTEGER SCHE
0004                DIMENSION SCHE (105) ,ADDONS(12,20)
                C          REPORT 2 REQ'D
0005                IF (RCHE.EQ.0) GO TO 200
0006                II = 26
                C
                C
0007                DO 100 I=1,I4YR
0008                   SCHE(II)=ADDONS(4,I)+0.5
0009                II = II+4
0010             100  CONTINUE
                C
0011                                WRITE(IODV) IYEAR, SCHE
                C
0012             200 RETURN
0013                END

FORTRAN IV G LEVEL 1, MOD 4            CRUPDT          DATE = 70288          03/30/23

0001                SUBROUTINE CRUPDT (ISCH,VALUE,AVAL)
                C       ROUTINE TO UPDATE RETENTION CELL MATRIX & BASE MATRICES
0002                COMMON /RETCOM/ RETRAT(4,4,20),RETCEL(4,4,20),RETCC(25),RETCCL(25)
0003                COMMON /BASCOM/ BASE(4),BAS4YR(4,20),BASCC(25)
0004                COMMON /OLDRAT/ OLDRE(105),OLDRR(105),OLDRT(2070)
0005                REAL*4 VALUE(14),AVAL(14),SAVE(14),BASRUN(4),BL
0006                LOGICAL*1 OLDRE,OLDRR,OLDRT
0007                DATA BL/'    '/
0008                IMAT = 1
0009                GO TO 25
0010                ENTRY        BRUPDT (ISH,VALUE,AVAL)
                C       ROUTINE TO  UPDATE RETENTION RATE MATRIX (NO-BASE)
0011                IMAT = -1
0012             25 CONTINUE
0013                DO 26 I = 1,14
0014                SAVE(I) = -9.
0015             26 CONTINUE
0016                DO 27 I = 1,4
0017                BASRUN(I)= -1.
0018             27 CONTINUE
0019                OLDRR(ISCH) = .TRUE.
0020                IF (ISCH.GT.25) GO TO 120
0021                SAVE(1) = RETCC(ISCH)
0022                IF (IMAT) 50 , 50 , 30
0023             30 CONTINUE
0024                IF (AVAL(1).EQ.BL) GO TO 35
0025                BASCC(ISCH) =  VALUE(1)
0026             35 CONTINUE
0027                IF (AVAL(5).EQ.BL)  GO TO 40
0028                RETCCL (ISCH) = VALUE(5)
0029             40 CONTINUE
0030                IF (BASCC(ISCH) .NE.0.0) GO TO 45
0031                RETCC(ISCH)=0.0
0032                GO TO 200
0033             45   CONTINUE
0034                RETCC(ISCH) = RETCCL(ISCH)/ BASCC(ISCH)
0035                GO TO  200
```

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0036            50 CONTINUE
0037               RETCC (ISCH) = VALUE(5)
0038               GO TO  200
0039           120 CONTINUE
0040               IF (IMAT) 132,132,125
0041           125 CONTINUE
0042               ISH1 =  (ISCH-22)/4
0043               DO 130 I = 1,4
0044               IF (AVAL(I).EQ.BL) GO TO 130
0045               BAS4YR (I,ISH1) = VALUE(I)
0046               BASRUN (I) = 1.
0047           130 CONTINUE
0048           132 CONTINUE
0049               K = 4
0050               DO 140 I = 1,4
0051               DO 140 J = I,4
0052               K = K+1
0053               IF (AVAL(K).EQ.BL) GO TO 140
0054               SAVE (K-4) = RETRAT (I,J,ISH1)
0055               IF(IMAT) 138,138,135
0056           135 CONTINUE
0057               RETCEL(I,J,ISH1) = VALUE(K)
0058               IF(BAS4YR(I,ISH1) .NE.0.0) GO TO 137
0059               RETRAT(I,J,ISH1) =0.0
0060               GO TO 140
0061           137  CONTINUE
0062               RETRAT (I,J,ISH1 ) = VALUE(K)/BAS4YR(I,ISH1)
0063               GO TO 140
0064           138 CONTINUE
0065               RETRAT (I,J,ISH1) = VALUE(K)
0066           140 CONTINUE
0067               K =  0
0068               DO 150 I = 1,4
0069               DO 150 J = I,4
0070               K =  K+1
0071               IF (BASRUN(I).NE.1.) GO TO 150
0072               IF (SAVE(K).NE.-9.) GO TO 150
0073               SAVE(K) = RETRAT (I,J,ISH1)
0074               IF (BAS4YR (I,ISH1) .NE. 0.0) GO TO 147
0075               RETRAT(I,J,ISH1)=0.0
0076               GO TO 150
0077           147  CONTINUE
0078               RETRAT (I,J,ISH1) = RETCEL(I,J,ISH1) / BAS4YR (I,ISH1)
0079           150 CONTINUE
0080           200 CONTINUE
0081               IREC = ISCH + 105
0082               WRITE (8'IREC) ISCH,SAVE
0083               RETURN
0084               END
```



```
0001               SUBROUTINE CTUPDT(IYR,RTYPE,RIDNT,ISCH,VALUE,AVAL,CODE)
                C  ROUTINE TO UPDATE CELL/TRANSFER MATRIX
0002               COMMON /XERC/                    XECEL(46,105)
0003               COMMON /XERR/ XERAT(46,105)
0004               COMMON /BASCOM /BASE(4),BAS4YR(4,20),BASCC(25)
0005               COMMON /OLDRAT/ OLDRE(105),OLDRR(105),OLDRT(2070)
0006               REAL*4 VALUE(14),AVAL(14),SAVE(14),BL
0007               LOGICAL*1 OLDRE,OLDRR,OLDRT
0008               INTEGER * 2 RTYPE,RIDNT
0009               DATA BL/'    '/
0010               IMAT = 1
0011               GO TO 25
0012               ENTRY      RTUPDT(IYR,RTYPE,RIDNT,ISCH,VALUE,AVAL,CODE)
                C  ROUTINE  TO  UPDATE RATE  TRANSFER MATRIX
0013               IMAT = -1
0014            25 CONTINUE
0015               DO 26  I = 1, 14
0016               SAVE(I) = -9.
0017            26 CONTINUE
```

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C     CHECK **FROM SCHOOL** FOR BLANK
      IF(ISCH.EQ.0.OR.AVAL(5).EQ.BL) GO TO 140
C     CONVERT FROM SCHOOL TO INTEGER VALUE
      IVALUE    = VALUE(5)
C     CHECK FOR FROM SCHOOL = 0 ,INDICATING OUT OF STATE
      IF (IVALUE    .NE.0) GO TO 100
      JSCH = 46
      IVALUE = 46
      GO TO 112
  100 CONTINUE
      JSCH = IVALUE
      IF (IVALUE    .LE.25) GO TO 110
C     INDICATES 4YR COLLEGE AND MUST CONVERT TO MATRIX POSITION.
      JSCH =    (((IVALUE    -26)/4)+26
  110 CONTINUE
      IF (JSCH.GT.46) GO TO 140
  112 CONTINUE
      IF(ISCH.GT.25) GO TO 113
      MX = ISCH
      GO TO 114
  113 CONTINUE
      MX=((ISCH-26)/4+26
  114 CONTINUE
      IREC = ( MX -1)*46 + JSCH
      OLDRT (IREC) = .TRUE.
      IF(ISCH.GT.25) GO TO 120
      IF(AVAL(1).EQ.BL) GO TO 140
      SAVE(1) = XFRAT(JSCH,ISCH)
      IF(IMAT) 118, 118 , 115
  115 CONTINUE
      XFCEL (JSCH,ISCH) = VALUE(1)
        IF (JSCH .GT. 25) GO TO 116
      IF (BASCC(JSCH) .NE.0.0) GO TO 315
      XFRAT(JSCH,ISCH) =0.0
      GO TO 130
  315 CONTINUE
      XFRAT (JSCH,ISCH) = XFCEL(JSCH,ISCH)/BASCC(JSCH)
      GO TO 130
  116 CONTINUE
      IF (JSCH.NE.46) GO TO 316
      BAS4 = BASE(4)
      GO TO 417
  316 CONTINUE
      BAS4=0.
      JSH1=JSCH-25
      DO 117 I=1,4
      BAS4=BAS4+BAS4YR(I,JSH1)
  117 CONTINUE
  417 CONTINUE
      IF (BAS4 .NE.0.0) GO TO 317
      XFRAT(JSCH,ISCH) =0.0
      GO TO 130
  317 CONTINUE
      XFRAT(JSCH,ISCH)= XFCEL(JSCH,ISCH)/BAS4
      GO TO 130
  118 CONTINUE
      XFRAT (JSCH,ISCH) = VALUE(1)
      GO TO 130
  120 CONTINUE
      DO 125 I = 1,4
      IF (AVAL(I).EQ.BL) GO TO 125
      K = ISCH+I-1
      SAVE (I) = XFRAT(JSCH,K)
      IF(IMAT) 123, 123 , 121
  121 CONTINUE
      XFCEL (JSCH,K) = VALUE(I)
      IF (JSCH .GT.25) GO TO 321
      IF(BASCC(JSCH) .NE.0.0) GO TO 321
      XFRAT(JSCH,K) =0.0
      GO TO 125
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FORTRAN IV G LEVEL 1, MOD 4            CTUPDT          DATE = 70288          03/30/23
 0084          321  CONTINUE
 0085               XERAT(JSCH,K)=VALUE(I)/BASCC(JSCH)
 0086               GO TO 125
 0087          221  CONTINUE
 0088               IF (JSCH.NE.46) GO TO 421
 0089               BAS4 = BASE(4)
 0090               GO TO 422
 0091          421  CONTINUE
 0092               JSH1=JSCH-25
 0093               BAS4 = 0.
 0094               DO 122 J=1,4
 0095               BAS4=BAS4 + BAS4YR(J,JSH1)
 0096          122  CONTINUE
 0097          422  CONTINUE
 0098               IF(BAS4 .NE.0.0) GO TO 322
 0099               XERAT(JSCH,K) =0.0
 0100               GO TO 125
 0101          322  CONTINUE
 0102               XERAT (JSCH,K) = VALUE(I)/BAS4
 0103               GO TO 125
 0104          123  CONTINUE
 0105               XERAT (JSCH,K) = VALUE(I)
 0106          125  CONTINUE
 0107          130  CONTINUE
 0108               IREC = 210 + IREC
 0109               WRITE (8'IREC) ISCH,SAVE
 0110               GO TO  150
 0111          140  CONTINUE
               C    ERROR  CODE  GOES HERE
 0112               CODE = -1
 0113               WRITE (6,999) IYR,RTYPE,RIDNT,ISCH,VALUE
 0114          999  FORMAT('0',I4,1X,2A1,I3,14F5.0,' CARD ERROR')
 0115          150  CONTINUE
 0116               RETURN
 0117               END
FORTRAN IV G LEVEL 1, MOD 4            ENTRNC          DATE = 70288          03/30/23

 0001               SUBROUTINE ENTRNC (SENT, IODV, IYEAR,RENTR)
               C         ROUTINE TO COMPUTE THE ENTRANCES BY SCHOOL/CLASS
               C        AND PREPARE THE INFO FOR FINAL REPORT
 0002               INTEGER*2 RENTR
 0003               INTEGER SENT,ENTOT,RETOT,RETOTC
 0004               COMMON /BASCOM/ BASE(4), BAS4YR(4,20), BASCC(25)
 0005               COMMON /ENTCOM/ ENTRAT(4,105), ENTCEL(4,105)
 0006               COMMON /NUMSCH/ I4YR,ICC,I4YRCL,ISCHL,ICLTOT
 0007               COMMON /TOTALS/ ENTOT(4,105), RETOT(4,4,20), RETOTC(25)
               C
 0008               DIMENSION SENT(105)
               C
 0009               DO 100 I=1,ICLTOT
 0010               SENT(I)=0
 0011          100  CONTINUE
               C    BASE * RATE = ENTOT.
 0012               DO 120 I=1,4
 0013               DO 120 J=1,ICLTOT
               C        GET TOTAL ENTRANCES PER SCHOOL.
 0014               ENTOT(I,J) = BASE(I) * ENTRAT(I,J) +0.5
 0015               SENT(J)=SENT(J)+ ENTOT(I,J)
 0016          120  CONTINUE
               C        CHECK FOR REPORT 2 REQUIRED.
 0017               IF (RENTR .NE. 0 ) WRITE(IODV) IYEAR,SENT
 0018               RETURN
 0019               END
FORTRAN IV G LEVEL 1, MOD 4            ENTSUM          DATE = 70288          03/30/23

 0001               SUBROUTINE ENTSUM (SENT,INDX, SHEAD, IARAY, ISTU, RHEAD,ENTOT)
               C         ROUTINE TO PREPARE THE ENTRANCE PORTION OF THE
               C         SUMMARY/DETAIL REPORT.
 0002               INTEGER SENT,ENTOT
 0003               REAL *8 RHEAD
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FORTRAN IV G LEVEL 1, MOD 4              ENTSUM          DATE = 70288        03/30/23
0004                 COMMON /NUMSCH/ I4YR, ICC, I4YTL, ISCHL, ICLTOT
0005                 DIMENSION          SENT(105), SHEAD(3,14), ENTOT(4,105),ISTU(5),
                    1          RHEAD(5), IARAY(5)
                C
0006                 IPRT = 6
                C         CHECK FOR CC OR 4 YEAR
0007                 IF (INDX .LE. ICC) GO TO 300
                C         4- YEAR SCHOOL.
0008                 II=INDX-1
                C         ENTRANCES-  TOTALS.
0009                 IARAY(5) = 0
0010                 DO 110 I=1,4
0011                 IARAY(I) = SENT(II+I)
0012                 ISTU(I) =ISTU(I) + IARAY(I)
0013           110   IARAY(5) = IARAY(5) + IARAY(I)
0014                 WRITE(IPRT,9000) (SHEAD(K,1),K=1,3)
0015                 WRITE(IPRT,9010)  RHEAD(1),IARAY
                C         ENTRANCES - HS, MIL,...
0016                 DO 140 J= 1,4
0017                 IK= J+1
0018                 IARAY(5) = 0
0019                 DO 130 I=1,4
0020                 IJ = II +I
0021                 IARAY(I) = ENTOT(J,IJ)
0022                 IARAY(5) = IARAY(5) + IARAY(I)
0023           130   CONTINUE
0024           140   WRITE(IPRT,9010)   RHEAD(IK), IARAY
0025                 GO TO 1000
0026           300   CONTINUE
                C         COMMUNITY COLLEGES
                C         ENTRANCES-  TOTALS.
0027                 ICCTL =  SENT(INDX)
0028                 ISTU(5)=ISTU(5)+ICCTL
0029                 WRITE (IPRT,9000) (SHEAD(K,1),K=1,3)
0030                 WRITE (IPRT,9010)  RHEAD(1), ICCTL
                C         HI-SCHOOL, MIL,---
0031                 DO 310 I=1,4
0032                 IK =I+1
0033                 IDUM = ENTOT(I,INDX)
0034                 WRITE(IPRT,9010)  RHEAD(IK), IDUM
0035           310   CONTINUE
0036           9000  FORMAT (1H0,T16,3A4)
0037           9010  FORMAT (1H ,T16,A8,T35, 5(I8,2X))
0038           1000  CONTINUE
0039                 RETURN
0040                 END
FORTRAN IV G LEVEL 1, MOD 4              EXTS            DATE = 70288        03/30/23

0001                 SUBROUTINE EXTS ( IODV,IYEAR, REXIT,XEROUT)
                C         ROUTINE TO COMPUTE EXITS AND PREPARE FOR FINAL REPORT.
                C         EXITS=BASE-TRANSFERS OUT-RETENTIONS.
0002                 INTEGER*2 REXIT
0003                 INTEGER SENT, SRET, SXFR, SEXIT, SCHE, STOT
0004                 INTEGER EXT,RET,XEROUT
0005                 COMMON /SUMTOT/ SENT(105),SRET(105),SXFR(105),SEXIT(105),
                    1                SCHE(105),STOT(105)
0006                 COMMON /NUMSCH/ I4YR, ICC, I4YRCL, ISCHL,ICLTOT
0007                 COMMON /BASCOM/ BASE(4), BAS4YR(4,20), BASCC(25)
                C
0008                 DIMENSION XEROUT(46), SHEAD(3,14), IARAY(5) ,EXT(4,20)
0009                 DIMENSION RET(4,20)
                C
0010                 EQUIVALENCE (EXT(1,1),SEXIT(26))
0011                 EQUIVALENCE(RET(1,1), SRET(26))
                C         COMM COLL.
0012                 DO 100 I=1,ICC
0013           100   SEXIT(I)= BASCC(I)-XEROUT(I) -SRET(I)+0.5
                C         4 YEAR
                C         ZERO TABLE
0014                 DO 110 I=1,4
0015                 DO 110 J=1,I4YR
```

```
FORTRAN IV G LEVEL 1, MOD 4            EXTS                DATE = 70288          03/30/23
0016          110  EXT(I,J)=0
0017               DO 130 I=1,I4YR
0018               DO 120 J=1,4
0019          120  EXT(1,I)= EXT(1,I)+BAS4YR(J,I)-RET(J,I)
0020          130  EXT(1,I)= EXT(1,I)-XFROUT(ICC+I)
                C          REPORT 2 REQ'D
0021               IF (REXIT .NE. 0) WRITE(IODV) IYEAR, SEXIT
0022               RETURN
0023               END


FORTRAN IV G LEVEL 1, MOD 4            HEAD                DATE = 70288          03/30/23

0001               SUBROUTINE HEAD (HEADNG,YEAR,IPAGE,     ITEMP)
                C          ROUTINE TO PRODUCE PAGE HEADING FOR CHANGE REPORTS.
0002               REAL*4 HEADNG(8)
0003               INTEGER*4 YEAR,ITEMP
0004               INTEGER*2 DRN
0005               COMMON /CALDAT/ DRN(3)
0006               DATA PERM/'PERM'/,TEMP/'TEMP'/
0007               IPAGE = IPAGE + 1
0008               IF (ITEMP.EQ.0) GO TO 100
0009               ILIST = PERM
0010               GO TO 110
0011            100 ALIST = TEMP
0012            110 CONTINUE
0013               WRITE (6,1000) HEADNG,YEAR,IPAGE
0014           1000 FORMAT ('1',20X,8A4,14X,I4,4X,'PAGE ',I4)
0015               WRITE (6,1001) (DRN(I),I=1,3)
0016           1001FORMAT ('0',20X,'REVISED BASE AND CELL POPULATIONS',7X,
                  1          'DATE RUN  ',A2,'/',A2,'/',A2)
0017               WRITE (6,1002) ALIST
0018           1002 FORMAT (21X,'(CHANGES ONLY)',32X,A4 )
0019               WRITE (6,1003)
0020           1003FORMAT ('0',17X,'SCHOOL',8X,'BASE',4X,'CELL',5X,'OLD',9X,'NEW',
                  1          7X,'DIFF',6X,'%' /
                  2          32X,                'POP',5X, 'POP',6X,'RATE',8X,'RATE',
                  3          5X,'(RATE)',4X,'DIFF' /'0' )
0021               RETURN
0022               END


FORTRAN IV G LEVEL 1, MOD 4            HEAD1               DATE = 70288          03/30/23

0001               SUBROUTINE HEAD1 (YEAR,ITEMP,SCH,CLSS)
                C          ROUTINE TO PRODUCE PAGE HEADING FOR RATE REPORTS.
0002               REAL * 8SCH(2)
0003               REAL*4 CLSS(2)
0004               INTEGER*4 YEAR,ITEMP,PERM,TEMP
0005               INTEGER*2 DRN
0006               COMMON /CALDAT/ DRN(3)
0007               DATA PERM/'PERM'/,TEMP/'TEMP'/
0008               IF (ITEMP.EQ.0) GO TO 100
0009               ILIST = PERM
0010               GO TO 110
0011            100 ILIST = TEMP
0012            110 CONTINUE
0013               WRITE (6,1000) DRN,ILIST,SCH,CLSS,YEAR
0014           1000FORMAT ('1',11X,'DISTRIBUTION RATES BY SOURCE AND DESTINATION',
                  1          T58,'*** DATE ',2(A2,'/'),A2,T76,A4,' ***'/
                  2          1H ,T41,'*** ',2A8,2X,2A4,T76,I4,' ***')
0015               RETURN
0016               END
```

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FORTRAN IV G LEVEL 1, MOD 4            INITL            DATE = 70288          03/30/23

0001                  SUBROUTINE INITL (ADDON)
                C     THIS ROUTINE INITIALIZES ALL MATRICES TO 0.0
0002                  COMMON /XERC/ XECEL(46,105)
0003                  COMMON /XERR/ XERAT(46,105)
0004                  COMMON /RETCOM/ RETRAT(4,4,20),RETCEL(4,4,20),RETCC(25),RETCCL(25)
0005                  COMMON /ENTCOM/ ENTRAT(4,105),ENTCEL (4,105)
0006                  COMMON /BASCOM/ BASE(4),BAS4YR(4,20),BASCC(25)
0007                  DIMENSION ADDON (12,20)
0008                  DO  200 J = 1, 105
0009                  DO  100 I = 1, 4
0010                  ENTCEL(I,J) = 0.
0011                  ENTRAT(I,J) = 0.
0012              100 CONTINUE
0013                  DO  200 I = 1,46
0014                  XERAT(I,J)=0.0
0015                  XECEL(I,J)=0.0
0016              200 CONTINUE
0017                  DO  300 K = 1,20
0018                  DO  300 J = 1,4
0019                  BAS4YR(J,K) = 0.
0020                  DO  300 I = 1,4
0021                  RETRAT (I,J,K) = 0.
0022                  RETCEL (I,J,K) = 0.
0023              300 CONTINUE
0024                  DO 400 I=1,4
0025                  BASE(I) = 0.
0026              400 CONTINUE
0027                  DO 500 I=1,25
0028                  BASCC(I) =0.
0029                  RETCC(I) =0.
0030                  RETCCL(I)=0.
0031              500 CONTINUE
0032                  DO 600 I=1,20
0033                  DO 600 J=1,12
0034                  ADDON(J,I)=0.0
0035              600 CONTINUE
0036                  CALL INTOLD
0037                  RETURN
0038                  END


FORTRAN IV G LEVEL 1, MOD 4            INTOLD           DATE = 70283          03/30/23

0001                  SUBROUTINE INTOLD
0002                  COMMON /OLDRAT/ OLDRE(105),OLDRR(105),OLDRT(2070)
0003                  LOGICAL*1 OLDRE,OLDRR,OLDRT
0004                  DO 700 I = 1,105
0005                  OLDRE (I) = .FALSE.
0006                  OLDRR (I) = .FALSE.
0007              700 CONTINUE
0008                  DO 750 I=1,2070
0009                  OLDRT (I) = .FALSE.
0010              750 CONTINUE
0011                  RETURN
0012                  END


FORTRAN IV G LEVEL 1, MOD 4            LIST11           DATE = 70288          03/30/23

0001                  SUBROUTINE LIST11
                C     ROUTINE TO READ DISK AND FORMAT DETAIL REPORT OF CHANGES
                C          IN BASE AND CELL POPULATION FOR ENTRANCE MATRIX
0002                  COMMON /BASCOM/ BASE(4),BAS4YR(4,20),BASCC(25)
0003                  COMMON /ENTCOM/ ENTRAT(4,105),ENTCEL (4,105)
0004                  COMMON /OLDRAT/OLDRE(105),OLDRR(105),OLDRT(2070)
0005                  COMMON /SCHNME/SCHL(2,46)
0006                  COMMON /OPT/ TEMP,TERST,YEAR
0007                  REAL*8 SCHL
```

```
0008              INTEGER*4 YEAR,TEMP
0009              REAL*4 ENCC(2,4),EN4Y(4,13)
0010              REAL*4 HEADEN(8),HEADRE(8),HEADTR(8),DTRN(3),SAVE(14)
0011              LOGICAL*1 OLDRE,OLDRR,OLDRT
0012              DATA ENCC       /'HI SC   ','MIL      ','IN ST   ','OUT ST  '/
0013             0DATA EN4Y       /'HI SC  TO FROSH ','MIL    TO FROSH ',
                  1                'IN ST  TO FROSH ','OUT ST TO FROSH ',
                  2                                   'MIL    TO SOPH  ',
                  3                'IN ST  TO SOPH  ','OUT ST TO SOPH  ',
                  4                                   'MIL    TO JUNIOR',
                  5                'IN ST  TO JUNIOR','OUT ST TO JUNIOR',
                  6                                   'MIL    TO SENIOR',
                  7                'IN ST  TO SENIOR','OUT ST TO SENIOR'/
0014              DATA HEADEN       /'E N T R A N C E   M A T R I X   '/
0015              MXLINE = 58
0016              LINE   = 100
0017              IPAGE = 0
                C     CHECK IF ANY CHANGES IN ENTRANCE MATRIX.
0018              DO  250 M = 1,105
0019              IF (.NOT.OLDRE(M)) GO TO 250
0020              KREC = M
                C     READ DISK AND LIST ENTRANCE MATRIX CHANGES.
0021              IF (LINE.LT.MXLINE) GO TO 120
0022              CALL HEAD (HEADEN (1) ,YEAR,IPAGE,     TEMP)
0023              LINE = 9
0024            120 CONTINUE
0025              READ (9'KREC) ISCH,SAVE
0026              IF ( KREC.GT.25) GO TO 180
                C     INDICATES CC AND CALC AND LIST.
0027             1000 FORMAT (' ',10X,2A8)
0028              WRITE (6,1000) (SCHL(L,ISCH),L=1,2)
0029              LINE = LINE+1
0030              DO 125 L = 1,4
0031              IF (SAVE(L).EQ.-9.0) GO TO 125
0032              RTNW = ENTRAT(L,ISCH)
0033              ODRT = SAVE(L)
0034              DELT = RTNW - ODRT
0035              IF (RTNW .NE. 0) GO TO 121
0036              PRCT=0.0
0037              GO TO 123
0038             121  CONTINUE
0039              PRCT=(DELT / RTNW) * 100.0
0040             123  CONTINUE
0041              IBSE = BASCC(L)
0042              ICEL = ENTCEL(L,ISCH)
0043              WRITE (6,1001)(ENCC(N,L),N=1,2),IBSE,ICEL,ODRT   ,RTNW,DELT,PRCT
0044              LINE = LINE+1
0045             1001 FORMAT (' ',13X,2A4,8X,I7,I8,F11.7,F11.7,F10.7,F7.1)
0046              IF (LINE.LT.MXLINE) GO TO 122
0047              CALL HEAD (HEADEN(1),YEAR,IPAGE,     TEMP)
0048              LINE = 9
0049            122 CONTINUE
0050            125 CONTINUE
0051              GO TO 250
0052            180 CONTINUE
0053              KSCH = ((ISCH-25)/4) + 26
0054              ISH  = ISCH - 1
0055              ISH1 = (ISCH-22)/4
0056              K = 0
0057              WRITE (6,1000) (SCHL(L,KSCH),L=1,2)
0058              LINE = LINE+1
0059              DO 230 J = 1,4
0060              DO 230 I = 1,4
0061              IF (I.EQ.1.AND.J.NE.1) GO TO 230
0062              K= K + 1
0063              IF (SAVE(K).EQ.-9.) GO TO 230
0064              RTNW = ENTRAT(I,J+ISH)
0065              ODRT = SAVE(K)
0066              DELT = RTNW - ODRT
0067              IF (RTNW .NE. 0) GO TO 200
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FORTRAN IV G LEVEL 1, MOD 4            LIST11          DATE = 70288        03/30/23

0068                  PRCT=0.0
0069                  GO TO 210
0070            200   CONTINUE
0071                  PRCT=(DELT / RTNW) * 100.0
0072            210   CONTINUE
0073                  IBSE = BAS4YR(I,ISH1)
0074                  ICEL = ENTCEL(I,J+ISH)
0075                 WRITE (6,1002)(EN4Y(N,K    ),N=1,4),
                     1                    IBSE,ICEL,ODRT,RTNW,DELT,PRCT
0076                  LINE = LINE+1
0077            1002 FORMAT (' ',12X,4A4,I8,I8,F11.7,F11.7,F10.7,F7.1)
0078                  IF (LINE.LT.MXLINE) GO TO 220
0079                  CALL HEAD (HEADEN(1),YEAR,IPAGE,      TEMP)
0080                  LINE = 9
0081             220  CONTINUE
0082             230  CONTINUE
0083             250  CONTINUE
0084                  CALL LISTAA
0085                  CALL LISTBB
0086                  RETURN
0087                  END


FORTRAN IV G LEVEL 1, MOD 4            LIST12          DATE = 70288        03/30/23

0001                  SUBROUTINE LIST12(M)
                C           ROUTINE TO PRODUCE RATE MATRICES REPORT.
0002                  COMMON /BASCOM/ BASE(4),BAS4YR(4,20),BASCC(25)
0003                  COMMON /ENTCOM/ ENTRAT(4,105), ENTCEL(4,105)
0004                  COMMON /RETCOM/ RETRAT(4,4,20),RETCEL(4,4,20),RETCC(25),RETCCL(25)
0005                  COMMON /XERC/                  XECEL(46,105)
0006                  COMMON /XERR/ XERAT(46,105)
0007                  COMMON /SCHNME/SCHL(2,46)
0008                  COMMON /OPT/ TEMP,IFRST,YEAR
0009                  REAL*8 SCHL
0010                  INTEGER * 4 IBASE(4) ,TEMP,YEAR
0011                  INTEGER*4 IND1(3),IND2(3)
0012                  REAL*4 ALINE(3)
0013                  REAL*4 CLSS(2,5)
0014                  REAL*8 BLK,ASCHL(2,3)
0015                  DATA IND1/1,26,46/
0016                  DATA IND2/25,45,46/
0017                  DATA BLK/'        '/
0018                  DATA CLSS/'FRESHMAN','SOPHMORE','JUNIOR  ','SENIOR  ','        '/
0019                  DO  10 I = 1,4
0020                  IBASE(I) = BASE(I)
0021             10   CONTINUE
0022                  IF (M.GT.25) GO TO 50
0023                  M1 = M
0024                  M2 = 5
0025                  GO TO 70
0026             50   CONTINUE
0027                  M1 = 25+(M-22)/4
0028                  M2 = M-21-(((M-22)/4)*4)
0029             70   CONTINUE
0030                  CALL HEAD1(YEAR,TEMP,SCHL(1,M1),CLSS(1,M2))
0031                  WRITE (6,1000)IBASE ,(ENTRAT(I,M ),I=1,4)
0032            1000FORMAT('0',10X,'ENTRANCES              HI-SCHOOL',6X,'MIL',6X,
                     1       'IN-STATE',4X,'OUT-STATE'/'0',20X,
                     2  'BASES ',4I12/'0',20X,'RATE  ',4(2X,F10.6)/'0',10X,
                     2       'TRANSFERS ')
0033                  DO 80 II=1,3
0034                  IN1=IND1(II)
0035                  IN2=IND2(II)
0036                  J=0
0037                  DO 75 I=IN1,IN2
0038                  IF(SCHL(1,I) .NE.BLK) GO TO 73
0039                  IF(J .NE.0 .AND. I .GE. IN2) GO TO 74
0040                  GO TO 75
0041            73    CONTINUE
```

```
0042                  J=J+1
0043                  ASCHL(1,J)=SCHL(1,I)
0044                  ASCHL(2,J)=SCHL(2,I)
0045                  ALINE(J)=XFRAT(I,M)
0046                  IF(J .NE.0 .AND. I .GE. IN2) GO TO 74
0047                  IF (J .LE. 2) GO TO 75
0048            74    CONTINUE
0049                  WRITE(6,1001)((ASCHL(L,MM),L=1,2),ALINE(MM),MM=1,J)
0050                  J=0
0051            75    CONTINUE
0052                  WRITE(6,1005)
0053            1005  FORMAT ('0')
0054            80    CONTINUE
0055            1001  FORMAT ('0',10X,2A8,F9.6,1X,2A8,F9.6,1X,2A8,F9.6 )
0056                  IF (M.GT.25) GO TO 100
0057                  WRITE (6,1002) RETCC(M)
0058            1002  FORMAT ('0',10X,'RETENTIONS ',F10.6)
0059                  WRITE(6,1004) BASCC(M)
0060            1004  FORMAT(1H0,10X,'BASE',9X,F11.1)
0061                  GO  TO   200
0062             100  CONTINUE
0063                  ISCH = (M-22)/4
0064                  WRITE (6,1003)   (RETRAT(I,M2,ISCH),I=1,4)
0065            1003OFORMAT ('0',10X,'RETENTIONS ',11X,'FROSH',6X,'SOPH',4X,
                     1          'JUNIOR',4X,'SENIOR' /'0',28X,4F10.6)
0066                  WRITE(6,1004) BAS4YR(M2,ISCH)
0067             200  CONTINUE
0068                  RETURN
0069                  END
```

FORTRAN IV G LEVEL 1, MOD 4 LISTAA DATE = 70288 03/30/23

```
0001                  SUBROUTINE LISTAA
                C           ROUTINE TO READ DISK AND FORMAT DETAIL REPORT
                C           OF CHANGES IN RETENTION MATRIX.
0002                  COMMON /BASCOM/ BASE(4),BAS4YR(4,20),BASCC(25)
0003                  COMMON /RETCOM/ RETRAT(4,4,20),RETCEL(4,4,20),RETCC(25),RETCCL(25)
0004                  COMMON /OLDRAT/OLDRE(105),OLDRR(105),OLDRT(2070)
0005                  COMMON /SCHNME/SCHL(2,46)
0006                  COMMON /OPT/ TEMP,IFRST,YEAR
0007                  REAL*8 SCHL
0008                  INTEGER*4 YEAR,TEMP
0009                  REAL*4 HEADEN(8),HEADRE(8),HEADTR(8),DTRN(3),SAVE(14)
0010                  REAL*4  RE4Y(4,10)
0011                  LOGICAL*1 OLDRE,OLDRR,OLDRT
0012                 ODATA RE4Y       /'FROSH  - FROSH  ','FROSH  - SOPH   ',
                      1                'FROSH  - JUNIOR ','FROSH  - SENIOR ',
                      2                                   'SOPH   - SOPH   ',
                      3                'SOPH   - JUNIOR ','SOPH   - SENIOR ',
                      5                'JUNIOR - JUNIOR ','JUNIOR - SENIOR ',
                      7                                   'SENIOR - SENIOR '/
0013                   DATA HEADRE       /'R E T E N T I O N   M A T R I X '/
0014                   MXLINE = 58
0015                   IPAGE = 0
0016                   LINE = 100
0017                   DO 500 M = 1,105
0018                   IF (.NOT.OLDRR(M)) GO TO 500
0019                   KREC = M + 105
0020                   IF (LINE.LT.MXLINE) GO TO 320
0021                   CALL HEAD (HEADRE(1),YEAR,IPAGE,      TEMP)
0022                   LINE = 9
0023             320 CONTINUE
0024                   READ (8'KREC) ISCH,SAVE
0025                   IF (ISCH.GT.25) GO TO 380
0026                   RTNW = RETCC(ISCH)
0027                   ODRT = SAVE(1)
0028                   DELT = RTNW - ODRT
0029                   IF (RTNW .NE.0) GO TO 340
0030                   PRCT=0.0
0031                   GO TO 350
```

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FORTRAN IV G LEVEL 1, MOD 4             LISTAA              DATE = 70298          03/30/23
 0032          340  CONTINUE
 0033               PRCT=(DELT / RTNW) * 100.0
 0034          350  CONTINUE
 0035               IBSE = BASCC(ISCH)
 0036               ICEL = RETCCL(ISCH)
 0037              OWRITE (6,2001) (SCHL(L,ISCH),L=1,2),
                   1                    IBSE,ICEL,ODRT,RTNW,DELT,PRCT
 0038          2001 FORMAT (' ',10X,2A8,3X,I7,I8,F11.7,F11.7,F10.7,F7.1)
 0039               LINE = LINE + 1
 0040               GO TO  500
 0041           380 CONTINUE
 0042               KSCH = ((ISCH-26)/4) + 26
 0043               WRITE (6,1000) (SCHL(L,KSCH),L=1,2)
 0044          1000 FORMAT (' ',10X,2A8)
 0045               LINE = LINE + 1
 0046               K = 0
 0047               DO  400 I = 1,4
 0048               DO  400 J = I,4
 0049               K = K + 1
 0050               IF (SAVE(K).EQ.-9.0) GO TO 400
 0051               ISH1 = (ISCH-22)/4
 0052               RTNW = RETRAT(I,J,ISH1)
 0053               ODRT = SAVE(K)
 0054               DELT = RTNW - ODRT
 0055               IF (RTNW .NE. 0) GO TO 360
 0056               PRCT=0.0
 0057               GO TO 370
 0058          360  CONTINUE
 0059               PRCT=(DELT / RTNW) * 100.0
 0060          370  CONTINUE
 0061               IBSE = BAS4YR(I,ISH1)
 0062               ICEL = RETCEL(I,J,ISH1)
 0063               IF (LINE.LT.MXLINE ) GO TO 390
 0064               CALL HEAD (HEADRE(1),YEAR,IPAGE,      TEMP)
 0065               LINE = 9
 0066           390 CONTINUE
 0067              OWRITE (6,1002) (RE4Y(N,K    ),N=1,4),
                   1                    IBSE,ICEL,ODRT,RTNW,DELT,PRCT
 0068          1002 FORMAT (' ',12X,4A4,I8,I8,F11.7,F11.7,F10.7,F7.1)
 0069               LINE = LINE + 1
 0070           400 CONTINUE
 0071           500 CONTINUE
 0072               RETURN
 0073               END


FORTRAN IV G LEVEL 1, MOD 4             LISTBB              DATE = 70288          03/30/23

 0001               SUBROUTINE LISTBB
                C          ROUTINE TO READ DISK AND FORMAT DETAIL REPORT
                C          OF CHANGES IN TRANSFER MATRIX.
 0002               COMMON /BASCOM/ BASE(4),BAS4YR(4,20),BASCC(25)
 0003               COMMON /XERC/                        XECEL(46,105)
 0004               COMMON /XERR/ XERAT(46,105)
 0005               COMMON /OLDRAT/OLDRE(105),OLDRR(105),OLDRT(2070)
 0006               COMMON /SCHNME/SCHL(2,46)
 0007               COMMON /OPT/ TEMP,IFRST,YEAR
 0008               REAL*8 SCHL
 0009               INTEGER*4 YEAR,TEMP
 0010               REAL*4 HEADEN(8),HEADRE(8),HEADTR(8),DTRN(3),SAVE(14)
 0011               REAL*4 TRCC,TR4Y(4)
 0012               LOGICAL*1 OLDRE,OLDRR,OLDRT
 0013               DATA HEADTR       /'T R A N S F E R   M A T R I X   '/
 0014               DATA TRCC /'FROM'/
 0015               DATA TR4Y /'ER  ','SC  ','JR  ','SR  '/
 0016               MXLINE = 58
 0017               IPAGE = 0
 0018               LINE = 100
 0019               M3 =  0
 0020               DO 750 M1 = 1,45
```

```
0021              DO 750 M2 = 1,46
0022              M3 =  M3+1
0023              IF (.NOT.OLDRT(M3)) GO TO 750
0024              KREC = M3 + 210
0025              IF (LINE.LT.MXLINE) GO TO 520
0026              CALL HEAD (HEADTR(1),YEAR,IPAGE,      TEMP)
0027              LINE = 9
0028          520 CONTINUE
0029              READ (8'KREC) ISCH,SAVE
0030              IF (ISCH.GT.25) GO TO 530
0031              RTNW = XFRAT (M2,M1)
0032              ODRT = SAVE(1)
0033              DELT = RTNW - ODRT
0034              IF (RTNW .NE.0.0) GO TO 525
0035              PRCT=0.0
0036              GO TO 526
0037          525 CONTINUE
0038              PRCT=(DELT / RTNW) * 100.0
0039          526 CONTINUE
0040              IBSE = BASCC(M1)
0041              ICEL = XFCEL (M2,M1)
0042             WRITE (6,3000) (SCHL(L2,M2),L2=1,2),
                 1                (SCHL(L1,M1),L1=1,2),
                 2                 IBSE,ICEL,ODRT,RTNW,DELT,PRCT
0043          3000 FORMAT (' ',10X,'FROM  ',2A8,' TO ',/
                 1 ' ', 10X,   2A8,3X,I7,I8,2F11.7,F10.7,F7.1)
0044              LINE = LINE + 2
0045              GO TO 750
0046          530 CONTINUE
0047              IF (LINE.LT.MXLINE) GO TO  535
0048              CALL HEAD(HEADTR(1),YEAR,IPAGE,      TEMP)
0049              LINE = 9
0050          535 CONTINUE
0051              WRITE (6,3001) (SCHL(L2,M2),L2=1,2 )
0052          3001 FORMAT (' ',10X,'FROM  ',2A8,' TO ')
0053              LINE = LINE + 1
0054              ISH2 =  M1-25
0055              DO  540 M4 = 1,4
0056              IF (SAVE(M4).EQ.-9.0) GO TO 540
0057              ISH1 = (M1-25)*4 +21+M4
0058              RTNW = XFRAT (M2,ISH1)
0059              ODRT = SAVE(M4)
0060              DELT = RTNW-ODRT
0061              IF (RTNW .NE.0.0) GO TO 537
0062              PRCT=0.0
0063              GO TO 538
0064          537 CONTINUE
0065              PRCT=(DELT / RTNW) * 100.0
0066          538 CONTINUE
0067              IBSE = BAS4YR(M4,ISH2)
0068              ICEL = XFCEL (M2,ISH1)
0069              WRITE (6,3002) (SCHL(L1,M1),L1=1,2), TP4Y(M4)   ,
                 1  IBSE,ICEL,ODRT,RTNW,DELT,PRCT
0070          3002 FORMAT (' ',10X,2A8,A2,1X,I7,I8,F11.7,F11.7,F10.7,F7.1)
0071              LINE = LINE + 1
0072           540 CONTINUE
0073           750 CONTINUE
0074              RETURN
0075              END
```

```
FORTRAN IV G LEVEL 1, MOD 4            NEWBAS          DATE = 70288        03/30/23

0001                  SUBROUTINE NEWBAS
                C           ROUTINE TO COMPUTE NEW BASE VALUES.
                C           NEW BASE= ENTRANCES+RETENTIONS + TRANSFERS IN
0002                  INTEGER SENT, SRET, SXFR, SEXIT, SCHE, STOT
0003                  REAL*4 NBASE
                C
0004                  COMMON /BASCOM/ BASE(4), BAS4YR(4,20), BASCC(25)
0005                  COMMON /NUMSCH/ I4YR, ICC, I4YRCL,ISCHL, ICLTOT
0006                  COMMON /SUMTOT/ SENT(105),SRET(105),SXFR(105),SEXIT(105),
                     1                SCHE(105),STOT(105)
                C
0007                  DIMENSION  NBASE(80)
                C
0008                  EQUIVALENCE (NBASE(1), BAS4YR(1,1))
                C
                C           4 YEAR
0009                  DO 100 I=1,I4YRCL
0010                  II=ICC+I
0011                100  NBASE(I)= SENT(II)+SRET(II)+SXFR (II)
                C                 COMM COLL
0012                  DO 110 I= 1,ICC
0013                110  BASCC(I)=SENT(I)+SRET(I)+SXFR(I)
0014                  RETURN
0015                  END

FORTRAN IV G LEVEL 1, MOD 4            PRNTOP          DATE = 70288        03/30/23

0001                  SUBROUTINE PRNTOP (ITEMP,IFRST,ISCHL,ADDON)
                C           ROUTINE TO READ THE PRINT OPTION CARD AND SET UP THE
                C           PRINT OPTION ARRAYS.
0002                  INTEGER * 2 REPRT1,REPRT2
                C
0003                  COMMON /RPT1/ REPRT1(48),REPRTA
0004                  COMMON /RPT2/ REPRT2(9)
                C
0005                  DIMENSION ADDON (12,20)
                C
0006                  ICARD=5
0007                  CALL INTOLD
0008                  READ (ICARD,9000) REPRT1,REPRT2,ITEMP,IFRST,REPRTA
                C        REPRTA .EQ. 0 --- NO RATE REPORT
                C     CHECK FOR FIRST TIME.
0009                  IF (IFRST.EQ.0) GO TO 85
                C           FIRST TIME --INITIALIZE ARRAYS
0010                  CALL INITL(ADDON)
0011                  GO TO 86
                C           NOT FIRST TIME--
0012                 85 CONTINUE
                C           READ RATE, CELL, AND BASE INFO.
0013                  CALL RDCOM
0014                 86 CONTINUE
                C           CHECK FOR ALL SCHOOLS REQ'D
0015                  IF (REPRT1(46) .EQ.1)GO TO 95
                C           NOT ALL SCHOOLS REPORTS DESIRED.  DO NOT DO FINAL REPORT
0016                  DO  90 I=1,9
0017                 90   REPRT2(I) = 0
0018                  GO TO 110
                C           SET ALL REPORTS ON
0019                 95   CONTINUE
0020                  DO 100 I=1,ISCHL
0021                  REPRT1(I) = 1
0022                100  CONTINUE
0023                110  CONTINUE
0024               9000  FORMAT(48I1, 1X, 9I1, 2X, 2I1, 2X, I1)
0025                  RETURN
0026                  END
```

```
FORTRAN IV G LEVEL 1, MOD 4            RATREP          DATE = 70288        03/30/23

0001          SUBROUTINE RATREP(SCHL,IFRST)
      C            ROUTINE TO PREPARE THE RATE REPORTS FOR SCHOOLS TO BE PRINTED.
0002          REAL*8 SCHL (2,46) ,BLNK
0003          INTEGER *2 RPTREQ    ,RPTALL,RPTALL,RPTSUM,RPTDET
0004          COMMON /NUMSCH/ I4YR, ICC, I4YRCL, ISCHL,ICLTOT
0005          COMMON /RPT1/ RPTREQ(45), RPTALL, RPTSUM,RPTDET,REPRTA
0006          DATA BLNK/8H        /
0007          IF (IFRST .NE. 0) GO TO 310
0008          CALL LIST11
0009        310 CONTINUE
0010          IF(REPRTA .EQ. 0) GO TO 350
0011          DO 340 I=1,ISCHL
0012          IF (SCHL(1,I).EQ.BLNK) GO TO 340
0013          IF (IFRST.NE.0) GO TO 315
0014          IF (RPTREQ (I).EQ.0) GO TO 340
0015        315 CONTINUE
0016          IF (I.GT.ICC) GO TO 320
0017          CALL LIST12(I)
0018          GO TO 340
0019        320 CONTINUE
0020          IND =(I-ICC)*4+ICC-3
0021          IND3 = IND + 3
0022          DO 330 IIND = IND,IND3
0023          CALL LIST12(IIND)
0024        330 CONTINUE
0025        340 CONTINUE
0026        350 CONTINUE
0027          IFRST = 0
0028          CALL INTOLD
0029          RETURN
0030          END

FORTRAN IV G LEVEL 1, MOD 4            RDCOM           DATE = 70288        03/30/23

0001          SUBROUTINE RDCOM
      C            ROUTINE TO READ/WRITE THE PERMANENT FILE.
0002          COMMON /BASCOM/ BASE(4), BAS4YR(4,20), BASCC(25)
0003          COMMON /ENTCOM/ ENTRAT(4,105), ENTCEL(4,105)
0004          COMMON /RETCOM/ RETRAT(4,4,20), RETCEL(4,4,20),
             1                RETCC(25), RETCCL(25)
0005          COMMON /XFRC/                  XFCEL(46,105)
0006          COMMON /XFRR/ XFRAT(46,105)
0007          IDSK = 9
0008          READ (IDSK) BASE,BAS4YR,BASCC
0009          READ (IDSK) ENTRAT,ENTCEL
0010          READ (IDSK) RETRAT,RETCEL,RETCC,RETCCL
0011          READ (IDSK) XFRAT,XFCEL
0012          REWIND IDSK
0013          RETURN
      C
0014          ENTRY WRCOM
0015          IDSK = 19
0016          WRITE(IDSK) BASE,BAS4YR,BASCC
0017          WRITE(IDSK) ENTRAT,ENTCEL
0018          WRITE(IDSK) RETRAT,RETCEL,RETCC,RETCCL
0019          WRITE(IDSK) XFRAT,XFCEL
0020          REWIND IDSK
0021          RETURN
0022          END
```

```
FORTRAN IV G LEVEL 1, MOD 4              RETEN              DATE = 70298          03/30/23

0001                  SUBROUTINE RETEN (SRET, IODV, IYEAR,RRET)
                C          ROUTINE TO COMPUTE THE RETENTIONS AND PREPARE THE FINAL
                C          REPORT INFO.
0002                  INTEGER SRET,ENTOT,RETOT,RETOTC
0003                  INTEGER*2 RRET
                C
0004                  COMMON /BASCOM/ BASE(4), BAS4YR(4,20), BASCC(25)
0005                  COMMON /NUMSCH/ I4YR, ICC, I4YRCL,ISCHL,ICLTOT
0006                  COMMON /RETCOM/ RETRAT(4,4,20), RETCEL(4,4,20),
                     1                RETCC(25), RETCCL(25)
0007                  COMMON /TOTALS/ ENTOT(4,105), RETOT(4,4,20), RETOTC(25)
0008                  DIMENSION SRET(105)
                C
                C          4 YEAR SCHOOLS
0009                  DO 100 K=1,I4YR
0010                  DO 100 I=1,4
0011                  DO 100 J=1,4
0012              100 RETOT(I,J,K) = BAS4YR(I,K) * RETRAT(I,J,K) +0.5
                C          COMM. COLL.
0013                  DO 110 I=1,ICC
0014              110 RETOTC(I) = BASCC(I) * RETCC(I) +0.5
                C               MOVE COMM COLL RETENTION INTO OUTPUT
0015                  DO 80 I=1,ICC
0016               80 SRET(I)= RETOTC(I)
0017                  II=ICC
0018                  DO 120 I=1,I4YR
0019                  DO 120 J=1,4
0020                  II = II+1
0021                  SRET(II)=0
0022                  DO 120 K=1,4
0023                  SRET(II)= SRET(II)+ RETOT(K,J,I)
0024              120 CONTINUE
                C          REPORT 2 REQ'D
0025                  IF (RRET .NE. 0) WRITE(IODV) IYEAR, SRET
0026                  RETURN
0027                  END


FORTRAN IV G LEVEL 1, MOD 4              RETSUM             DATE = 70298          03/30/23

0001                  SUBROUTINE RETSUM (SRET, INDX,  SHEAD, IARAY,ISTU,ICODE)
                C          ROUTINE TO PREPARE INFO FOR THE RETENTION PORTION OF THE
                C          SUMMARY/DETAIL REPORT.
0002                  INTEGER SRET,ENTOT,RETOT,RETOTC
0003                  REAL *8 CLASS
0004                  COMMON /NUMSCH/ I4YR, ICC, I4YTL, ISCHL, ICLTOT
0005                  COMMON /TOTALS/ ENTOT(4,105), RETOT(4,4,20), RETOTC(25)
0006                  DIMENSION SRET(105), SHEAD(3,14), IARAY(5),ISTU(5)
0007                  DIMENSION CLASS(5)
                C
0008                  DATA CLASS     /8HFROSH    , 8HSOPH      ,8HJUNIOR  ,8HSENIOR    ,
                     1                8HTOTAL    /
                C
0009                  IPRT =6
                C          CHECK FOR CC OR 4 YR.
0010                  IF(INDX  .LE. ICC) GO TO 300
                C          4 YEAR SCHOOL.
0011                  N4YR=(INDX-22)/4
                C          TOTALS
0012                  II=INDX-1
0013                  IARAY(5) = 0
0014                  DO 160 I=1,4
0015                  IARAY(I) = SRET(II+I)
0016                  IF (ICODE .NE. 0 ) GO TO 160
0017                  ISTU(I) = ISTU(I) +IARAY(I)
0018              160 IARAY(5) = IARAY(5) + IARAY(I)
0019                  WRITE(IPRT,9020) (SHEAD(I,2),I=1,3),CLASS(5),IARAY
                C          TEST FOR SUMMARY/DETAIL REPORT
```

```
FORTRAN IV G LEVEL 1, MOD 4          RETSUM          DATE = 70288          03/30/23

0029                IF (ICODE .NE. 0) RETURN
                C           SUMMARY
0031                DO 110 I=1,4
0032                IARAY(5) =0
0033                DO 100 J=1,4
0034                IARAY(J) = RETOT(I,J,N4YR)
0035           100  IARAY(5) = IARAY(5) + IARAY(J)
0036           110  WRITE(IPRT, 9040) CLASS(I), IARAY
0037                RETURN
                C           COMMUNITY COLLEGE
0038           300  CONTINUE
0039                IRCC =SRET(INDX)
0040                ISTU(5)=ISTU(5)+IRCC
0041                WRITE(IPRT,9020) (SHEAD(I,2),I=1,3),CLASS(5),IRCC
0042           9000 FORMAT (1H0, T16,3A4, T35,I8)
0043           9020 FORMAT (1H0,T16,3A4/1H ,T17,A8,T35,5(I8,2X))
0044           9040 FORMAT (1H ,T17,A8, T35, 5(I8,2X))
0045           1000 CONTINUE
0046                RETURN
0047                END
```

```
FORTRAN IV G LEVEL 1, MOD 4          RPTGEN          DATE = 70288          03/30/23          PAGE 0001

0001                SUBROUTINE RPTGEN(ISCHL,FADD,XFROUT,IYEAR,RHEAD,SHEAD,ITEM2)
                C           ROUTINE GENERATES THE SUMMARY/DETAIL REPORT AS REQUIRED.
0002                INTEGER XFROUT
0003                INTEGER*2       RPTREQ    , RPTALL, RPTSUM, RPTDET
0004                REAL*8 SCHL,BLNK
0005                REAL*8 RHEAD
0006                COMMON /RPTI /  RPTREQ(45), RPTALL, RPTSUM, RPTDET,XFRPTA
0007                COMMON /SCHNME/ SCHL(2,46)
0008                DATA BLNK/8H          /
0009                DIMENSION FADD(12,20),XFROUT(46),RHEAD(5),SHEAD(3,14)
0010                DO 240 I=1,ISCHL
0011                IF (SCHL(1,I) .EQ. BLNK) GO TO 240
0012                IF( RPTREQ(I) .EQ.0) GO TO 240
                C           SUMMARY REPORT REQ'D
0013                IF (RPTSUM.EQ. 0) GO TO 230
0014                ICODE=0
0015                CALL SUMRPI(I,FADD,XFROUT,IYEAR,RHEAD,SHEAD,ICODE,ITEM2)
0016           230  CONTINUE
                C           DETAIL REPORT REQ'D
0017                IF(RPTDET .EQ.0)GO TO 240
0018                ICODE=1
0019                CALL SUMRPI(I,FADD,XFROUT,IYEAR,RHEAD,SHEAD,ICODE,ITEM2)
0020           240  CONTINUE
0021                RETURN
0022                END
```

```
FORTRAN IV G LEVEL 1, MOD 4          R2DIFF          DATE = 70288          03/30/23          PAGE 0001

0001                SUBROUTINE R2DIFF(IARAY,NYRS,IDRAY)
                C           GET DIFFERENCES FOR FINAL REPORT.
                C
0002                DIMENSION IARAY(50,15),IDRAY(50,15)
                C
                C           GET DIFFERENCES
0003                JK=NYRS-1
0004                DO 100 J=1,JK
0005                JJ = J+1
0006                DO 100 I=1,50
0007           100  IDRAY(I,JJ)=IARAY(I,JJ)-IARAY(I,J )
0008                RETURN
0009                END
```

```
0001                  SUBROUTINE R2FMT(NYRS,ITEMP,IDX,IOUT,HDGYR,ITYP1)
                C          ROUTINE TO FORMAT ALL THE FINAL REPORTS.
                C          IDX INDICATES SUM, DIFF, OR % DIFF REPORT.
                C          ITYP1 INDICATES TOTALS,ENTRANCES,---
0002                  INTEGER*2 DRN
0003                  REAL *8 HDG, SCHL,       SUMHDG(2,5),BLNK ,HDG2(6)
                C
0004                  COMMON /CALDAT/ DRN(3)
0005                  COMMON /SCHNME/ SCHL(2,46)
                C
0006                  DIMENSION HDG(3), HDGYR(15),ITL(5),IOUT(50,15)
                C
0007                  DATA HDG /24H(SUM)    (DIFFER)(% DIFF) /,BLNK/8H         /
0008                  DATA HDG2    /48HTOTALS  ENTRANCERETEN   TRANSFEREXITS   CHEETE   /
0009                  DATA SUMHDG       / 16H  TOT COMM COLL ,16H  TOT PUB 4 YR      ,
                     1                    16H  TOT PRIV 4 YR ,16H  TOTAL 4 YEAR      ,
                     2                    16H  GRAND TOTAL     /
0010                  DATA ITP/4HTEMP/ ,IPRM/4HPERM/
                C
0011                  IRUN=ITP
0012                  IF (ITEMP .NE. 0) IRUN=IPRM
0013                  IST=1
0014                  IEN=5
0015                  IPRT =6
0016                  IF (IDX .NE. 1) IST= 2
                C          HEADING.
                C               DETERMINE NO. OF PAGES.
0017                  NPAGE = NYRS/5
0018                  IF(NPAGE *5 .LT. NYRS) NPAGE=NPAGE+1
0019                  DO 120 I= 1,NPAGE
0020                  WRITE(IPRT,9000)  HDG2(ITYP1),HDG(IDX),DRN,IRUN,I
0021                  IF (NYRS .LE.I*5) IEN=NYRS
0022                  IF (IEN .LT. IST) IEN=IST
0023                  IF (IDX    .NE.1) GO TO 80
0024                  WRITE(IPRT,9010) (HDGYR(K),K=IST,IEN)
0025                  GO TO 85
0026            80    CONTINUE
0027                  WRITE(IPRT,9040) (HDGYR(K),K=IST,IEN)
0028            85    CONTINUE
0029                  DO 100 J=1,45
0030                  IF (SCHL(1,J) .EQ.BLNK) GO TO 100
0031                  IF (IDX   .EQ. 1) GO TO 90
0032                  WRITE(IPRT,9030)(SCHL(K,J),K=1,2),(IOUT(J,JJ),JJ=IST,IEN)
0033                  GO TO 100
0034            90    CONTINUE
0035                  WRITE(IPRT,9020)(SCHL(K,J),K=1,2),(IOUT(J,JJ),JJ=IST,IEN)
0036            100   CONTINUE
0037                  DO 110 J=1,5
0038                  IF (IDX   .EQ. 1) GO TO 105
0039                  WRITE(IPRT,9030)(SUMHDG(K,J),K=1,2),(IOUT(J+45,JJ),JJ=IST,IEN)
0040                  GO TO 110
0041            105   CONTINUE
0042                  WRITE(IPRT,9020)(SUMHDG(K,J),K=1,2),(IOUT(J+45,JJ),JJ=IST,IEN)
0043            110   CONTINUE
0044                  IST=IEN+1
0045                  IEN=IST+4
0046            120   CONTINUE
0047            9000  FORMAT (1H1/1H0,T12,'PROJECTIONS OF ',2(A8,1X),T53,'*** ',

0048            9010  FORMAT (1H0,T33,5(I4,6X))
0049            9020  FORMAT (1H ,T11,2A8,T31, 5(I8,2X))
0050            9030  FORMAT (1H ,T11,2A8,T41, 4(I8,2X))
0051            9040  FORMAT (1H0,T43,4(I4,6X))
0052                  RETURN
0053                  END
```

```
FORTRAN IV G LEVEL 1, MOD 4          R2PDIF          DATE = 70288          03/30/23

0001                 SUBROUTINE R2PDIF (ISUM,NYRS,      IDRAY)
                C         ROUTINE TO COMPUTE PERCENT DIFFERENCES FOR FINAL REPORT.
                C
0002                 DIMENSION IDRAY(50,15),ISUM(50,15)
0003                 JK=NYRS-1
0004                 DO 100 J=1,JK
0005                 JJ =J+1
0006                 DO 100 I=1,50
0007                 IF (ISUM (I,J).NE.0) GO TO 90
0008                 IDRAY(I,JJ)=0
0009                 GO TO 100
0010              90 CONTINUE
0011                 IDRAY(I,JJ)=(IDRAY(I,JJ)*100)/ISUM(I,J)
0012             100 CONTINUE
0013                 RETURN
0014                 END

FORTRAN IV G LEVEL 1, MOD 4          R2READ          DATE = 70288          03/30/23

0001                 SUBROUTINE R2READ(WARAY, IODV,NYRS,IOUT,HDGYR)
                C         ROUTINE TO READ INFO FOR FINAL REPORT FROM FILE.
                C         INPUT IS BASED UPON SCHOOL CLASS  OUTPUT ON SCHOOL.
0002                 INTEGER WARAY
0003                 COMMON /NUMSCH/ I4YR, ICC, I4YRCL, ISCHL,ICLTOT
0004                 DIMENSION WARAY(105,15),IOUT(50,15),HDGYR(15)
0005                 IPR=31
0006                 IP=45
0007                 IC=ICC-4
0008                 DO 100 J=1,NYRS
0009             100 READ (IODV) HDGYR(J),(WARAY(I,J),I=1,105)
                C         GET TOTALS
0010                 DO 260 I= 1,NYRS
0011                 IOUT(46,I)=0
0012                 IOUT(47,I)=0
0013                 IOUT(48,I)=0
                C         COMM COLL
0014                 DO 200 J= 1,ICC
0015                 IOUT(46,I)=IOUT(46,I)+WARAY(J,I)
0016              200 IOUT(J,I) = WARAY(J,I)
                C         GET TOTALS, PUBLIC SCHOOL
0017                 DO 220 K=1,6
0018                 KK=IC+(K*4)
0019                 KJ=ICC+K
0020                 IOUT(KJ,I)=0
0021                 DO 210 L= 1,4
0022                 KL=KK+L
0023              210 IOUT(KJ,I)=IOUT(KJ,I)+WARAY(KL,I)
0024              220 IOUT(47,I)=IOUT(47,I)+IOUT(KJ,I)
                C         GET TOTALS, PRIVATE SCHOOL
0025                 DO 240 K=1,12
0026                 KK=IP+(K*4)
0027                 KJ=IPR+K
0028                 IOUT(KJ,I)=0
0029                 DO 230 L=1,4
0030                 KL=KK+L
0031              230 IOUT(KJ,I)=IOUT(KJ,I)+WARAY(KL,I)
0032              240 IOUT(48,I)=IOUT(48,I)+IOUT(KJ,I)
                C         C/C
                C
0033                 IOUT(49,I)=IOUT(47,I)+IOUT(48,I)
0034                 IOUT(50,I)=IOUT(49,I)+IOUT(46,I)
0035              260 CONTINUE
0036                 RETURN
0037                 END
```

```
FORTRAN IV G LEVEL 1, MOD 4            SUMREP          DATE = 70288        03/30/23

0001                SUBROUTINE SUMREP(NYRS,ITEMP)
                C       ROUTINE TO PREPARE FINAL REPORTS (AS REQUIRED).
0002                INTEGER WARAY
0003                INTEGER*2 RTOTL,RDIFF,RPERC,RDUM
                C
0004                COMMON /RPT2/RDUM(6),RTOTL,RDIFF,RPERC
0005                COMMON /INOUT/ IO(6)
                C
0006                DIMENSION WARAY(105,15),IDRAY(50,15),ISUM(50,15)
0007                DIMENSION HDGYR(15)
                C
0008                ISW=0
0009                NYRS=NYRS-1
                C       CHECK MAX YEARS LT 15
0010                IF ( NYRS .GT. 15) NYRS =15
                C       CHECK FOR FINAL REPORT REQUIRED.
0011                DO 120  I=1,6
0012                IF (RDUM(I) .EQ.0) GO TO 120
0013                IODV=IO(I)
0014                REWIND IODV
                C       READ APPROPRIATE FILE.
0015                CALL R2READ(WARAY,IODV,NYRS,ISUM,HDGYR)
                C       CHECK TOTAL RPT REQD.
0016                IF (RTOTL .NE. 0) CALL R2FMT ( NYRS,ITEMP,1,ISUM,HDGYR,I)
                C       CHECK DIFF REPORT REQ'D
0017                IF (NYRS .LT. 2) GO TO 120
0018                IF (RDIFF .EQ. 0) GO TO 100
0019                CALL R2DIFF(ISUM,  NYRS,IDRAY)
0020                CALL R2FMT(NYRS,ITEMP,2,IDRAY,HDGYR,I)
0021                ISW =1
                C       PERC. DIFF
0022             100  CONTINUE
0023                IF (RPERC .EQ. 0) GO TO 120
0024                IF(ISW .EQ. 0) CALL R2DIFF(ISUM,  NYRS, IDRAY)
0025                CALL R2PDIF (ISUM,NYRS,IDRAY)
0026                CALL R2FMT(NYRS,ITEMP,3,IDRAY,HDGYR,I)
0027             120   CONTINUE
0028             130  RETURN
0029                END


FORTRAN IV G LEVEL 1, MOD 4            SUMRP1          DATE = 70288        03/30/23

0001                SUBROUTINE SUMRP1 (INDX,ADDONS, XEROUT,IYEAR,RHEAD,SHEAD,ICODE,
                   1  ITEMP)
                C       THIS SUBROUTINE WILL PREPARE AND PRINT THE SUMMARY/DETAIL
                C       REPORT BY SCHOOL AND YEAR.
0002                REAL *8 SCHL, RHEAD,SPECHD,REP,SUM,DET
0003                INTEGER *2 DRN
0004                INTEGER*4 TEMP
0005                INTEGER SENT, SRET, SXFR, SEXIT, SCHE, STOT
0006                INTEGER XEROUT,ENTOT ,RETOT,RETOTC
                C
0007                COMMON /CALDAT/ DRN(3)
0008                COMMON /NUMSCH/ I4YR, ICC, I4YTL, ISCHL, ICLTOT
0009                COMMON /SUMTOT/ SENT(105),SRET(105),SXFR(105),SEXIT(105),
                   1                SCHE(105),STOT(105)
0010                COMMON /SCHNME/ SCHL(2,46)
0011                COMMON /TOTALS/ ENTOT(4,105), RETOT(4,4,20), RETOTC(25)
                C
0012                DIMENSION XEROUT(46) ,          IARAY(5),ISTU(5),ADDONS(12,20)
0013                DIMENSION RHEAD(5), SHEAD(3,14), SPECHD(5)
                C
0014                DATA SPECHD    /40H SPECIAL GRAD    PROF    CHE. UNGRAD         /
0015                DATA IPERM/'PERM'/,TEMP/'TEMP'/,SUM/'SUMMARY '/,DET/'DETAIL  '/
                C
0016                IPRT = 6
                C       SET UP PERM/TEMP HEADING
0017                IRUN=TEMP
```

```
0018                IF(ITEMP .NE.0) IRUN=IPERM
                C       CLEAR ARRAYS-
0019                DO 90 I=1,5
0020                ISTU(I) =0
0021             90 CONTINUE
0022                IF (ICODE) 100,100,110
                C        SUMMARY REPORT.
0023            100 CONTINUE
0024                REP=SUM
0025                WRITE(IPRT,9000) REP,DRN,IRUN,      (SCHL(I,INDX),I=1,2),IYEAR
0026                GO TO 120
                C        DETAIL REPORT.
0027            110 CONTINUE
0028                REP=DET
0029                WRITE(IPRT,9000) REP,DRN,IRUN,      (SCHL(I,INDX),I=1,2),IYEAR
0030            120 CONTINUE
                C       COMMUNITY COLLEGE OR 4 YEAR
0031                IF (INDX .LE. ICC) GO TO 300
                C       4 YEAR SCHOOL--
0032                WRITE(IPRT,9010)
                C         CALCULATE ARRAY INDEX (COLUMN)
0033                N4YR = INDX -ICC
0034                IN4YR= ICC +(N4YR*4)-3
                C       GET ENTRANCES FOR THIS SCHOOL.
0035                CALL ENTSUM (SENT,IN4YR,SHEAD,IARAY,ISTU,RHEAD,ENTOT)
                C            RETENTIONS.
0036                CALL RETSUM (SRET,IN4YR,SHEAD,IARAY,ISTU,ICODE)
                C            TRANSFERS.
0037                CALL XFRSUM (SXFR,IN4YR,SHEAD,IARAY,ISTU,ICODE)
0038                IF (ICODE .NE.0) RETURN
                C        SUMMARY REPORT
                C       CALCULATE TOTALS

0039                DO 200 I=1,4
0040            200 ISTU(5) = ISTU(5)+ ISTU(I)
0041                WRITE(IPRT,9040) (SHEAD(I,7),I=1,3), ISTU
                C       STUDENT ADD-ONS--
0042                WRITE(IPRT,9040) (SHEAD(I,8),I=1,3)
0043                DO 210 I=1,3
0044                IADON=ADDONS(I,N4YR)
0045                WRITE(IPRT,9020) SPECHD(I), IADON
                C       GET STUDENT GRAND TOTAL
0046            210 ISTU(5) = ISTU(5) + IADON
0047                WRITE(IPRT,9050) (SHEAD(I,9),I=1,3), ISTU(5)
                C       CHE-FTE
0048                IARAY(5) = 0
0049                DO 230 I=1,4
0050                IARAY(I) = ADDONS(I+4,N4YR) * ISTU(I) + 0.5
0051                IARAY(5) = IARAY(5) + IARAY(I)
0052            230 CONTINUE
0053                WRITE(IPRT,9030) (SPECHD(K),K=4,5),(IARAY(L),L=1,4)
0054                ICHE=ADDONS(4,N4YR)
0055                WRITE(IPRT,9050) (SHEAD(I,10),I=1,3), ICHE
                C            CHE TOTALS
0056                ICHE=ICHE +IARAY(5)
0057                WRITE(IPRT,9050) (SHEAD(I,11),I=1,3), ICHE
                C       GET EXITS.
0058                IEXT= SEXIT(IN4YR)
0059                WRITE(IPRT,9050) (SHEAD(I,12),I=1,3), IEXT
                C       RESIDENT- NONRESIDENT
0060                IARAY(5) =0
0061                DO 250 I=1,4
0062                IARAY(I) = ISTU(I) *( ADDONS(8+I,N4YR))   +0.5
0063            250 IARAY(5) = IARAY(5) + IARAY(I)
0064                WRITE(IPRT,9040) (SHEAD(I,13),I=1,3), IARAY
0065                IARAY(5) =0
0066                DO 260 I=1,4
0067                IARAY(I)= ISTU(I) * (1.0-ADDONS(8+I,N4YR)) +0.5
0068            260 IARAY(5) = IARAY(5) + IARAY(I)
```

```
FORTRAN IV G LEVEL 1, MOD 4            SUMRP1            DATE = 70288        03/30/23

0069                WRITE(IPRT,9040) (SHEAD(I,14),I=1,3), IARAY
0070                RETURN
              C          COMMUNITY COLLEGES
0071             300  CONTINUE
              C                 ENTRANCES.
0072                CALL ENTSUM (SENT,INDX ,SHEAD,IARAY,ISTU,RHEAD,ENTOT)
0073                CALL RETSUM (SRET,INDX, SHEAD,IARAY,ISTU,ICODE)
0074                CALL XFRSUM (SXFR,INDX,SHEAD,IARAY,ISTU,ICODE)
0075                IF (ICODE .NE.0 ) RETURN
              C          TOTALS
0076                WRITE(IPRT,9040) (SHEAD(I, 7),I=1,3), ISTU(5)
              C          EXITS
0077                IEXT =SEXIT(INDX)
0078                WRITE(IPRT,9040) (SHEAD(I,12),I=1,3), IEXT
0079             9000  FORMAT (1H1/1H ,T30,A8,T53,'*** DATE ',2(A2,'/'),
                     1A2,T76,A4,' ***'/
                     1                1H ,T16,'ENROLLMENT-STUDENT FLOW PROJECTIONS',
                     2    T53,'*** ', 2A8,2X,I5,' ***')
0080             9010 FORMAT (1H0,T37,'FROSH     SOPH     JUNIOR     SENIOR     TOTALS'/
                     1  1H ,T35,'--------  -------  -------  -------  --------')
0081             9020 FORMAT (1H ,T17, A8, T75,I8)
0082             9030 FORMAT (1H0, T16, 2A8, T35, 5(I8,2X))

0083             9040 FORMAT (1H0, T16, 3A4, T35, 5(I8,2X))
0084             9050 FORMAT (1H0, T17, 3A4, T75, I8)
0085             1000 RETURN
0086                  END
```

```
FORTRAN IV G LEVEL 1, MOD 4            TOT               DATE = 70288        03/30/23

0001                SUBROUTINE TOT  ( IODV, IYEAR,ICLTOT,RTOT)
              C          COMPUTES TOTALS AND PREPARES FINAL REPORT INFO
              C          TOTALS=ENTRANCES+RETENTIONS +TRANSFERS IN
0002                INTEGER*2 RTOT
0003                INTEGER SENT, SRET, SXFR, SEXIT, SCHE, STOT
0004                COMMON /SUMTOT/ SENT(105),SRET(105),SXFR(105),SEXIT(105),
                   1                SCHE(105),STOT(105)
              C          SUM ENTRANCES, RETENTIONS, & TRANSFERS
0005                DO 100 I= 1,ICLTOT
0006             100  STOT(I)= SENT(I)+SRET(I)+SXFR(I)
              C          REPORT 2 REQ'D
0007                IF (RTOT .NE. 0) WRITE ( IODV) IYEAR,STOT
0008                RETURN
0009                END
```

```
FORTRAN IV G LEVEL 1, MOD 4            TRNFR             DATE = 70288        03/30/23

0001                SUBROUTINE TRNFR (SXFR, IODV, IYEAR,  RXFER,XFROUT)
              C          ROUTINE TO COMPUTE TRANSFERS.
0002                INTEGER*2 RXFER
0003                INTEGER SXFR,ENTOT,RETOT,RETOTC,SXCC,SX4YR,XFROUT,XTOT
              C
0004                COMMON /BASCOM/ BASE(4), BAS4YR(4,20), BASCC(25)
0005                COMMON /NUMSCH/ I4YR, ICC, I4YRCL,ISCHL,ICLTOT
0006                COMMON /TOTALS/ ENTOT(4,105), RETOT(4,4,20), RETOTC(25)
0007                COMMON /XFRR/ XFRAT(46,105)
0008                COMMON /XFRT/ SXCC(105), SX4YR(105)
              C
0009                DIMENSION XFROUT(46)
0010                DIMENSION SXFR(105)
              C
0011                II=ISCHL+1
0012                DO 80 I=1,II
0013                XFROUT(I) =0
0014             80 CONTINUE
0015                DO 130 K=1,ICLTOT
```

FORTRAN IV G LEVEL 1, MOD 4 TRNFR DATE = 70288 03/30/23

```
0016                  SXCC(K)= 0
0017                  SX4YR(K)=0
                C          COMM COLL
0018                  DO 100 I= 1,ICC
0019                  XTOT= BASCC(I)*XFRAT(I,K)  +0.5
0020                  SXCC(K)=  SXCC(K) +XTOT
0021                  XFROUT(I)= XFROUT(I)+XTOT
0022              100 CONTINUE
                C          4 YEAR SCHOOLS
0023                  JJ=ICC+1
0024                  DO 120 J=JJ,ISCHL
0025                  JK=J-25
0026                  BSTOT = 0.0
0027                  DO 110 I= 1,4
0028              110 BSTOT = BAS4YR(I,JK)+BSTOT
0029                  XTOT=XFRAT(J,K)*BSTOT +0.5
0030                  SX4YR(K)= SX4YR(K)+XTOT
0031                  XFROUT(J)= XFROUT(J)+XTOT
0032              120 CONTINUE
0033                  SXFR(K) = SXCC(K) + SX4YR(K) + (BASE(4) * XFRAT(46,K) + 0.5)
0034              130 CONTINUE
                C          REPORT 2 REQ'D
0035                  IF (PXFER .NE. 0) WRITE (IODV) IYEAR, SXFR
0036                  RETURN
0037                  END
```

FORTRAN IV G LEVEL 1, MOD 4 XFRSUM DATE = 70288 03/30/23 PAGE 0001

```
0001                  SUBROUTINE XFRSUM(SXFR,INDX,SHEAD,IARAY,ISTU,ICODE)
                C          ROUTINE TO PREPARE SUMMARY/DETAIL REPORT.
0002                  INTEGER SXFR,SXCC,SX4YR
0003                  REAL *8 SCHL, BLNK ,CLASS(5)
                C
0004                  COMMON /BASCOM/ BASE(4), BAS4YR(4,20), BASCC(25)
0005                  COMMON /NUMSCH/ I4YR, ICC, I4YTL, ISCHL, ICLTOT
0006                  COMMON /SCHNME/SCHL(2,46)
0007                  COMMON /XFRF/ XFRAT(46,105)
0008                  COMMON /XFRT/ SXCC(105), SX4YR(105)
                C
0009                  DATA BLNK/8H          /
                C
0010                  DIMENSION SXFR(105), SHEAD(3,14), IARAY(5), ISTU(5)
                C
0011                  IPRT=6
0012                  ICCX=0
0013                  ITI =0
0014                  IN=ICC+1
0015                  IJ=ISCHL+1
                C          CC OR 4 YR.
0016                  IF (INDX .LE. ICC) GO TO 300
0017                  IN4YR=INDX-1
                C          TOTALS
0018                  IARAY(5)=0
0019                  DO 100 I=1,4
0020                  IARAY(I)=SXFR(IN4YR+I)
0021                  IARAY(5)=IARAY(5)+IARAY(I)
0022                  IF(ICODE .NE. 0 ) GO TO 100
0023                  ISTU(I)=ISTU(I)+ IARAY(I)
0024              100 CONTINUE
0025                  WRITE(IPRT,9040) (SHEAD(K,3),K=1,3)
0026                  WRITE(IPRT,9050) (SHEAD(K,6),K=1,3), IARAY
                C          TEST FOR DETAIL/SUMMARY
0027                  IF (ICODE .EQ. 0) GO TO 180
                C          DETAIL REPORT
0028                  DO 130 J=1,ICC
0029                  IF (SCHL(1,J) .EQ. BLNK) GO TO 130
0030                  IARAY(5) =0
```

```
0031                  DO 115 I=1,4
0032                  IARAY(I)= BASCC(J)*XFRAT(J,IN4YR+I)  +0.5
0033                  IARAY(5)=IARAY(5) +IARAY(I)
0034            115   CONTINUE
0035                  WRITE(IPRT,9020) (SCHL(K,J),K=1,2),IARAY
0036            130   CONTINUE
0037                  DO 160 L=IN,ISCHL
0038                  IF(SCHL(1,L) .EQ. BLNK) GO TO 160
0039                  BSTOT=0.0
0040                  JJ=I-25
0041                  IARAY(5) =0
0042                  DO 120 J= 1,4
0043                  BSTOT=BSTOT+BAS4YR(J,JJ)
0044            120   CONTINUE
0045                  DO 150 I=1,4
0046                  IARAY(I)=BSTOT*XFRAT(L,IN4YR+I) +0.5
0047                  IARAY(5) = IARAY(5) + IARAY(I)
0048            150   CONTINUE
0049                  WRITE(IPRT,9020) (SCHL(K,L),K=1,2),IARAY
0050            160   CONTINUE
0051                  IARAY(5) =0
0052                  DO 170 I=1,4
0053                  IARAY(I)= BASE(4) *XFRAT(46,IN4YR+I)  +0.5
0054                  IARAY(5)=IARAY(5)+IARAY(I)
0055            170   CONTINUE
0056                  WRITE(IPRT,9020) (SCHL(K,46),K=1,2),IARAY
0057                  RETURN
                C          SUMMARY REPORT
0058             180  CONTINUE
                C           4 YR
0059                  IARAY(5)=0
0060                  DO 190 J=1,4
0061                  IARAY(J)= SX4YR(IN4YR+J)
0062                  IARAY(5)=IARAY(5)+IARAY(J)
0063             190  CONTINUE
                C
0064                  WRITE(IPRT,9050) (SHEAD(K,4),K=1,3), IARAY
                C           C/C
0065                  IARAY(5)=0
0066                  DO 200 J=1,4
0067                  IARAY(J)= SXCC(IN4YR+J)
0068                  IARAY(5)= IARAY(5) +IARAY(J)
0069               200 CONTINUE
0070                  WRITE(IPRT,9050) (SHEAD(K,5),K=1,3)    ,IARAY
                C           OUT OF STATE
0071                  GO TO 160
                C           COMMUNITY COLLEGE
0072             300  CONTINUE
                C              TOTALS
0073                  ITL=SXFR(INDX)
0074                  ISTU(5) = ISTU(5) +ITL
0075                  WRITE(IPRT,9040) (SHEAD(K,3),K=1,3)
0076                  WRITE(IPRT,9050) (SHEAD(K,6),K=1,3), ITL
0077                  IF (ICODE.NE.0) GO TO 320
                C          SUMMARY REPORT
                C            4 YEAR SCHOOLS
0078                  ITL=SX4YR(INDX)
0079                  WRITE(IPRT,9050) (SHEAD(K,4),K=1,3), ITL
                C             C/C
0080                  ICCX=SXCC(INDX)
0081                  WRITE(IPRT,9050) (SHEAD(K,5),K=1,3), ICCX
                C           OUT OF STATE
0082                  GO TO 350
                C             DETAIL REPORT
0083             320  CONTINUE
0084                  DO 330 I=1,ICC
0085                  IF (SCHL(1,I) .EQ. BLNK) GO TO 330
0086                  ITL=BASCC(I)*XFRAT(I,INDX) +0.5
0087                  WRITE(IPRT,9020) (SCHL(K,I),K=1,2), ITL
```

```
FORTRAN IV G LEVEL  1, MOD 4              XERSUM              DATE = 70288          13/30/23

0098          330  CONTINUE
0099               DO 350 I=IN,ISCHL
0100               IF (SCHL(1,I) .EQ. BLNK) GO TO 350
0101               JJ=I-25
0102               RSTOT=0.0
0103               DO 340 J=1,4
0104               RSTOT=RSTOT +RAS4YR(J,JJ)
0105          340  CONTINUE
0106               ITL=RSTOT*XFRAT(I,INDX)    +0.5
0107               WRITE(IPRT,9020) (SCHL(K,I),K=1,2), ITL
0108          350  CONTINUE
0109               ITL =RASE(4)*XFRAT(46,INDX) +0.5
0110               WRITE(IPRT,9020) (SCHL(K,46),K=1,2), ITL
0111          9020 FORMAT(1H ,T16,2A8,T35,5(I8,2X))
0112          9040 FORMAT (1H0, T15,3A4)
0113          9050 FORMAT (1H , T16,3A4,T35, 5(I8,2X))
0114          1000 CONTINUE
0115               RETURN
0116               END
```

```
FORTRAN IV G LEVEL  1, MOD 4              BLK DATA            DATE = 70288          13/30/23

0001               BLOCK DATA
0002               REAL *8 SCHL
0003               COMMON/SCHNME/SCHL(2,46)
0004               COMMON /SUMTOT/ SENT(105),SRET(105),SXFR(105),SEXIT(105),
                  1                SCHE(105),STOT(105)
0005               DATA SCHE /105*0.0/
0006               DATA SCHL/                16HPENINSULA CC    ,16HGRAYS HARBOR CC ,
                  1 16HOLYMPIC CC          ,16HSKAGIT VAL CC    ,16HEDMONDS CC      ,
                  2 16HEVERETT CC          ,16HSEATTLE CC       ,16HSHORELINE CC    ,
                  3 16HBELLEVUE CC         ,16HHIGHLINE CC      ,16HGREEN RIVER CC  ,
                  4 16HFT. STEILACOOM      ,16HCENTRALIA CC     ,16HLOWER COLUMBIA  ,
                  5 16HCLARK CC            ,16HWENATCHEE CC     ,16HYAKIMA CC       ,
                  6 16HSPOKANE CC          ,16HBIG BEND CC      ,16HCOLUMBIA BASIN  ,
                  7 16HWALLA WALLA CC      ,16HTACOMA CC        ,16H                ,
                  8 16H                    ,16H                 ,16HUNIV OF WASH    ,
                  9 16HWASH STATE UNIV     ,16HCENTRAL WASH ST  ,16HEASTERN WASH ST ,
                  A 16HWESTERN WASH ST     ,16H                 ,16HFT. WRIGHT COL  ,
                  B 16HGONZAGA UNIV        ,16HNORTHWEST COL    ,16HPACIFIC LUTHERN ,
                  C 16HST. MARTINS         ,16HSEATTLE PACIFIC  ,16HSEATTLE UNIV    ,
                  D 16HST. THOMAS SEM      ,16HU. PUGET SOUND   ,16HWALLA WALLA COL ,
                  E 16HWHITMAN COL         ,16HWHITWORTH COL    ,16H                ,
                  F 16H                    ,16HOUT OF STATE     /
0007               END
```

APPENDIX E

Input Formats for HEEP Model

The coding procedures and options are explained in this appendix with Figure E-1 illustrating the card layouts.

Print Option Card

The first card is the print option card which indicates the reports desired for which school. Columns 1-45 represent the potential for 25 community colleges and 20 four-year schools. Each column is punched with a non-zero punch if a Report One or Report One-A (see Appendix F) is desired for that school code. Column 46 generates *all* school reports. The next two fields, columns 47 and 48 specify if either summary and/or detail reports are required.

The following series of codes (columns 50-55) indicate the types of entries desired for Report Two: That is, **1)** student totals, and/or **2)** entrances, and/or **3)** retention, and/or **4)** transfers, and/or **5)** exits, and/or **6)** CHE totals. Also, for Report Two the possibilities of summary totals and/or difference analysis can be noted in columns 56-58. The coding of these options require that the "all schools" code (column 46) is punched.

The first of the final three fields, columns 61, notes whether the data to follow is permanent and therefore update the master file or temporary and not to be added to the file. A blank in column 61 implies temporary run. Column 62 is used to indicate the first run of the program and blank implies not a first run. The first run code tells the program there is no master file to be retrieved. The last field, column 64, is used to retrieve rate reports (Report A) when desired. Blank or zero implies no rate reports needed and a non-zero code indicates rate reports desired.

Entrance Card

The entrance cards and the other data input cards to follow all have the same format as shown in Figure E-1. The first four columns code year. Column 6 is coded B for base, C for Cell, or R for rate. The next column contains E specifying entrance. The fourth field, columns 8-10, contains the school code as referenced in Table E-1. These four fields are standard for the four types of input data.

The following 13 fields contain entries as noted on Figure E-1. Specific items of interest are that the 4 bases are coded in hundreds and the fields with astericks are used for community colleges, i.e., the freshman class is coded for community college input data.

Retention Card

The third field contains R for retention. The base code is dropped and the bases included in the first four data fields. The following ten fields only contain the acceptable retention classifications. In other words, regression of classes is not allowed.

Transfer Card

Similar to the above cards, column 7 contains a T. Each data card contains transfers from one school only. Hence, the possibility of zero to 41 transfer cards exists for any one school. The out-of-state transfer "from" school code is zero. The four class fields contain the number of transfers into the specified school.

Add-on Card

All add-ons are coded on one card with card type A in column 6. This card is not allowed for community colleges. The codes should be self-explanatory with the possible exception of CHE add-ons. These are FTE student add-ons and *not* headcounts which are then summed to produce the FTE student totals.

General conditions are that blank implies either no change or not required. The print option card is a required first card. From this point the entrance base card contains the exogenously inputted projecting variables and these cards must be in ascending annual sequential order. Temporary or permanent rate, cell or base changes can occur at any time in the projection stream.

TABLE E-1
LIST OF SCHOOL CODES

Community Colleges

Code	School
1	Peninsula CC
2	Grays Harbor CC
3	Olympic CC
4	Skagit Valley CC
5	Edmonds CC
6	Everett CC
7	Seattle CC
8	Shoreline CC
9	Bellevue CC
10	Highline CC
11	Green River CC
12	Ft. Steilacoom
13	Centralia CC
14	Lower Columbia
15	Clark CC
16	Wenatchee CC
17	Yakima CC
18	Spokane CC
19	Big Bend CC
20	Columbia Basin
21	Walla Walla CC
22	Tacoma CC
23	Whatcom CC
24	
25	

Universities and Colleges

Code	School
26	Univ. of Wash.
30	Wash. State Univ.
34	Central Wash. St.
38	Eastern Wash. St.
42	Western Wash. St.
46	Evergreen St.
50	Ft. Wright Col.
54	Gonzaga Univ.
58	Northwest Col.
62	Pacific Lutheran
66	St. Martin's Col.
70	St. Thomas Seminary
74	Seattle Pacific
78	Seattle Univ.
82	U. Puget Sound
86	Walla Walla Col.
90	Whitman Col.
94	Whitworth Col.
98	
102	

Class codes within schools are as follows:

Code	Class
School Code + 0	Freshman
School Code + 1	Sophomore
School Code + 2	Junior
School Code + 3	Senior

APPENDIX F

Output Reports

The model generates two sets of reports, one set prints the projection results in three different report formats and the second set prints rate information in two report formats. All reports are presented and discussed in this appendix. One general note is that all reports are formatted to less than 8½ x 11".

Report One is produced for a school-year and outputs student flows by class. This report is referred to as a summary report in that all student flows are presented with transfers summarized. **Report One-A** is similar to Report One with the transfers presented in detail and entitled a detail report.

Report Two includes the multiple year output for all schools. This report can be generated for any or all of the following: **1)** total students, **2)** entrances, **3)** retention, **4)** transfers, **5)** exits and **6)** CHE student FTE's. Also, difference analysis can be printed in this format.

The rate information reports are produced for two report types. The first, **Report A**, presents all rates for a school-class with the base year indicated. The second, **Report B**, is in three parts and presents *rate changes only* for each of the three main student flows, **1)** entrances, **2)** retention, and **3)** transfers. Included in this report are base population, cell population, the old rate, new rate, difference in rate and percent difference.

All reports are automatically dated on the date they were run on the computer and every report carries the identification of temporary (TEMP) or permanent (PERM). This then identifies the temporary or experimental data used in computer runs from the permanent or final data runs. Examples of each report follow.

REPORT 1

SUMMARY
ENROLLMENT-STUDENT FLOW PROJECTIONS

*** DATE 09/22/70
*** WASH STATE UNIV

PERM ***
1970 ***

	FROSH	SOPH	JUNIOR	SENIOR	TOTALS
ENTRANCES					
TOTAL	0	0	0	0	0
HI-SCH	0	0	0	0	0
MIL	0	0	0	0	0
IN-ST	0	0	0	0	0
OUT-ST	0	0	0	0	0
RETENTIONS					
TOTAL	0	0	0	0	0
FROSH	0	0	0	0	0
SOPH	0	0	0	0	0
JUNIOR	0	0	0	0	0
SENIOR	0	0	0	0	0
TRANSFERS					
TOTAL	0	0	0	0	0
4-YR COLL	0	0	0	0	0
COMM COLL	0	0	0	0	0
TOTALS	0	0	0	0	0
STU. ADD-ON					515
SPECIAL					1638
GRAD					239
PROF					
STU. TOTAL					2392
CHE. UNGRAD	0	0	0	0	
CHE. ADD-ON					292
CHE. TOTAL					292
EXITS					0
RESIDENTS	0	0	0	0	0
NON-RES	0	0	0	0	0

REPORT 1-A

DETAIL ENROLLMENT-STUDENT FLOW PROJECTIONS

*** DATE 09/22/70 *** WASH STATE UNIV

PERM *** 1970 ***

	FROSH	SOPH	JUNIOR	SENIOR	TOTALS
ENTRANCES					
TOTAL	0	0	0	0	0
HI-SCH	0	0	0	0	0
MIL	0	0	0	0	0
IN-ST	0	0	0	0	0
OUT-ST	0	0	0	0	0
RETENTIONS					
TOTAL	0	0	0	0	0
TRANSFERS					
TOTAL	0	0	0	0	0
PENINSULA CC	0	0	0	0	0
GRAYS HARBOR CC	0	0	0	0	0
OLYMPIC CC	0	0	0	0	0
SKAGIT VAL CC	0	0	0	0	0
EDMONDS CC	0	0	0	0	0
EVERETT CC	0	0	0	0	0
SEATTLE CC	0	0	0	0	0
SHORELINE CC	0	0	0	0	0
BELLEVUE CC	0	0	0	0	0
HIGHLINE CC	0	0	0	0	0
GREEN RIVER CC	0	0	0	0	0
FT. STEILACOOM	0	0	0	0	0
CENTRALIA CC	0	0	0	0	0
LOWER COLUMBIA	0	0	0	0	0
CLARK CC	0	0	0	0	0
WENATCHEE CC	0	0	0	0	0
YAKIMA CC	0	0	0	0	0
SPOKANE CC	0	0	0	0	0
BIG BEND CC	0	0	0	0	0
COLUMBIA BASIN	0	0	0	0	0
WALLA WALLA CC	0	0	0	0	0
TACOMA CC	0	0	0	0	0
UNIV OF WASH	0	0	0	0	0
WASH STATE UNIV	0	0	0	0	0
CENTRAL WASH ST	0	0	0	0	0
EASTERN WASH ST	0	0	0	0	0
WESTERN WASH ST	0	0	0	0	0
FT. WRIGHT COL	0	0	0	0	0
GONZAGA UNIV	0	0	0	0	0
NORTHWEST COL	0	0	0	0	0
PACIFIC LUTHERN	0	0	0	0	0
ST. MARTINS	0	0	0	0	0
SEATTLE PACIFIC	0	0	0	0	0
SEATTLE UNIV	0	0	0	0	0
ST. THOMAS SEM	0	0	0	0	0
U. PUGET SOUND	0	0	0	0	0
WALLA WALLA COL	0	0	0	0	0
WHITMAN COL	0	0	0	0	0
WHITWORTH COL	0	0	0	0	0
OUT OF STATE	0	0	0	0	0

REPORT 2

PROJECTIONS OF ENTRANCE (SUM)

	1968	1969	1970	1971	1972
PENINSULA CC	256	746	782	814	845
GRAYS HARBOR CC	510	1878	1967	2046	2128
OLYMPIC CC	683	3571	3741	3891	4046
SKAGIT VAL CC	590	2176	2279	2371	2466
EDMONDS CC	322	1846	1933	2011	2093
EVERETT CC	932	3337	3496	3636	3782
SEATTLE CC	417	6839	7158	7443	7744
SHORELINE CC	1216	2405	2521	2625	2730
BELLEVUE CC	814	3060	3206	3334	3469
HIGHLINE CC	1428	3589	3757	3909	4061
GREEN RIVER CC	1128	3083	3233	3365	3501
FT. STEILACOOM	196	1198	1251	1300	1351
CENTRALIA CC	604	1689	1771	1842	1916
LOWER COLUMBIA	492	1546	1620	1685	1753
CLARK CC	764	2465	2580	2681	2786
WENATCHEE CC	489	1048	1099	1143	1189
YAKIMA CC	1068	1986	2082	2168	2252
SPOKANE CC	1822	3728	3909	4068	4227
BIG BEND CC	330	942	987	1027	1067
COLUMBIA BASIN	882	2571	2694	2803	2914
WALLA WALLA CC	208	5512	5775	6006	6255
TACOMA CC	947	2246	2353	2450	2546
UNIV OF WASH	8079	7199	7558	7875	8190
WASH STATE UNIV	3351	3996	4193	4368	4539
CENTRAL WASH ST	2336	2405	2523	2628	2731
EASTERN WASH ST	2492	2510	2632	2742	2853
WESTERN WASH ST	2933	2987	3138	3269	3400
FT. WRIGHT COL	126	129	135	140	148
GONZAGA UNIV	605	643	675	702	729
NORTHWEST COL	230	266	279	289	300
PACIFIC LUTHERN	690	729	765	797	828
ST. MARTINS	211	228	239	249	259
SEATTLE PACIFIC	533	565	592	617	643
SEATTLE UNIV	738	763	801	834	867
ST. THOMAS SEM	13	23	24	25	26
U. PUGET SOUND	780	850	889	920	954
WALLA WALLA COL	545	615	645	671	697
WHITMAN COL	387	388	407	425	441
WHITWORTH COL	373	416	437	453	473
TOT COMM COLL	16098	57461	60194	62618	65121
TOT PUB 4 YR	19191	19097	20044	20882	21713
TOT PRIV 4 YR	5231	5615	5888	6122	6365
TOTAL 4 YEAR	24422	24712	25932	27004	28078
GRAND TOTAL	40520	82173	86126	89622	93199

REPORT 2

PROJECTIONS OF ENTRANCE (DIFFER) *** 07/27/70 TEMP ***
*** PAGE 1 ***

	1969	1970	1971	1972
PENINSULA CC	490	36	32	31
GRAYS HARBOR CC	1368	89	79	92
OLYMPIC CC	2888	170	150	155
SKAGIT VAL CC	1586	103	92	95
EDMONDS CC	1524	87	78	82
EVERETT CC	2405	159	140	140
SEATTLE CC	6422	319	285	301
SHORELINE CC	1189	116	104	105
BELLEVUE CC	2246	146	128	135
HIGHLINE CC	2161	169	152	152
GREEN RIVER CC	1955	150	132	130
FT. STEILACOOM	1062	53	69	61
CENTRALIA CC	1085	82	73	74
LOWER COLUMBIA	1054	74	65	68
CLARK CC	1771	115	101	100
WENATCHEE CC	559	51	48	50
YAKIMA CC	918	86	86	84
SPOKANE CC	1966	181	158	161
BIG BEND CC	612	55	50	49
COLUMBIA BASIN	1689	123	110	111
WALLA WALLA CC	5364	263	231	245
TACOMA CC	1299	107	99	96
UNIV OF WASH	-886	359	317	315
WASH STATE UNIV	645	137	121	121
CENTRAL WASH ST	69	104	105	103
EASTERN WASH ST	98	122	110	111
WESTERN WASH ST	54	151	131	131
FT. WRIGHT COL	3	4	5	4
GONZAGA UNIV	38	32	27	33
NORTHWEST COL	36	13	10	11
PACIFIC LUTHERN	39	36	32	31
ST. MARTINS	17	11	10	10
SEATTLE PACIFIC	32	27	25	26
SEATTLE UNIV	25	39	33	33
ST. THOMAS SEM	1	1	1	1
U. PUGET SOUND	72	49	31	38
WALLA WALLA COL	70	36	42	36
WHITMAN COL	1	14	13	14
WHITWORTH COL	43	21	16	20
TOT COMM COLL	41363	2733	2424	2553
TOT PUB 4 YR	-98	347	288	291
TOT PRIV 4 YR	384	273	234	243
TOTAL 4 YEAR	290	1220	1072	1074
GRAND TOTAL	41653	3953	3496	3627

REPORT 2

PROJECTIONS OF ENTRANCE (% DIFF) *** 07/27/70 TEMP ***
*** PAGE 1 ***

	1969	1970	1971	1972
PENINSULA CC	191	4	4	3
GRAYS HARBOR CC	268	4	4	4
OLYMPIC CC	422	4	4	3
SKAGIT VAL CC	268	4	4	4
EDMONDS CC	473	4	4	4
EVERETT CC	258	4	4	4
SEATTLE CC	1540	4	3	4
SHORELINE CC	97	4	4	4
BELLEVUE CC	275	4	3	4
HIGHLINE CC	151	4	4	3
GREEN RIVER CC	173	4	4	4
FT. STEILACOOM	511	4	3	3
CENTRALIA CC	179	4	4	4
LOWER COLUMBIA	214	4	4	4
CLARK CC	222	4	3	3
WENATCHEE CC	114	4	4	4
YAKIMA CC	85	4	4	3
SPOKANE CC	104	4	4	3
BIG BEND CC	185	4	4	3
COLUMBIA BASIN	191	4	4	3
WALLA WALLA CC	2550	4	4	4
TACOMA CC	137	4	4	3
UNIV OF WASH	-10	4	4	4
WASH STATE UNIV	19	4	4	3
CENTRAL WASH ST	2	4	4	3
EASTERN WASH ST	0	4	4	4
WESTERN WASH ST	1	5	4	4
FT. WRIGHT COL	2	4	3	5
GONZAGA UNIV	6	4	4	3
NORTHWEST COL	15	4	3	3
PACIFIC LUTHERN	5	4	4	3
ST. MARTINS	8	4	4	4
SEATTLE PACIFIC	6	4	4	4
SEATTLE UNIV	3	4	4	3
ST. THOMAS SEM	76	4	4	4
U. PUGET SOUND	8	4	3	3
WALLA WALLA COL	12	4	4	3
WHITMAN COL	0	4	4	3
WHITWORTH COL	11	5	3	4
TOT COMM COLL	256	4	4	3
TOT PUB 4 YR	0	4	4	3
TOT PRIV 4 YR	7	4	3	3
TOTAL 4 YEAR	1	4	4	3
GRAND TOTAL	102	4	4	3

REPORT A

DISTRIBUTION RATES BY SOURCE AND DESTINATION *** DATE 10/14/70 PERM ***
*** WASH STATE UNIV JUNIOR 1969 ***

ENTRANCES	HI-SCHOOL	MIL	IN-STATE	OUT-STATE
BASES	48000	2383000	481800	481800
RATE	0.0	0.0	0.001088	0.0

TRANSFERS

PENINSULA CC	0.004435	GRAYS HARBOR CC	0.008439	OLYMPIC CC	0.003535
SKAGIT VAL CC	0.002366	EDMONDS CC	0.0	EVERETT CC	0.001344
SEATTLE CC	0.000216	SHORELINE CC	0.001627	BELLEVUE CC	0.001378
HIGHLINE CC	0.001535	GREEN RIVER CC	0.001024	FT. STEILACOOM	0.0
CENTRALIA CC	0.006187	LOWER COLUMBIA	0.005972	CLARK CC	0.003071
WENATCHEE CC	0.015666	YAKIMA CC	0.009588	SPOKANE CC	0.002370
BIG BEND CC	0.000925	COLUMBIA BASIN	0.009484	WALLA WALLA CC	0.0
TACOMA CC	0.004693				

UNIV OF WASH	0.000480	WASH STATE UNIV	0.0	CENTRAL WASH ST	0.002120
EASTERN WASH ST	0.002140	WESTERN WASH ST	0.000589	FT. WRIGHT COL	0.003968
GONZAGA UNIV	0.001443	NORTHWEST COL	0.0	PACIFIC LUTHERN	0.003262
ST. MARTINS	0.003190	SEATTLE PACIFIC	0.001226	SEATTLE UNIV	0.000354
ST. THOMAS SEM	0.0	U. PUGET SOUND	0.001384	WALLA WALLA COL	0.0
WHITMAN COL	0.000929	WHITWORTH COL	0.001721		

OUT OF STATE	0.000220

RETENTIONS	FROSH	SOPH	JUNIOR	SENIOR
	0.028828	0.535783	0.066020	0.0
BASE	2166.0			

REPORT B

E N T R A N C E M A T R I X 1969 PAGE 1

REVISED BASE AND CELL POPULATIONS (CHANGES ONLY) DATE RUN 10/14/77

SCHOOL	BASE POP	CELL POP	OLD RATE	NEW RATE	DIFF (RATE)	% DIFF
PENINSULA CC						
IN ST	3677	485	0.0010025	0.0010366	0.0000342	3.4
ST. THOMAS SEM						
FRSH - SOPH	29	20	0.5172414	0.6896551	0.1724138	25.0
SOPH - JUNIOR	18	12	0.5555555	0.6666666	0.1111111	16.7
JUNIOR - SENIOR	18	12	0.6111111	0.6666666	0.0555555	8.3
FROM OUT OF STATE	TO					
PENINSULA CC	902	2	0.0	0.0000342	0.0000342	100.0
FROM OUT OF STATE	TO					
GRAYS HARBOR CC	1896	20	0.0	0.0000415	0.0000415	100.0
FROM OUT OF STATE	TO					
OLYMPIC CC	3677	9	0.0	0.0000187	0.0000187	100.0
FROM OUT OF STATE	TO					
SKAGIT VAL CC	2536	9	0.0	0.0000187	0.0000187	100.0
FROM OUT OF STATE	TO					
EDMONDS CC	1470	14	0.0	0.0000291	0.0000291	100.0
FROM OUT OF STATE	TO					
EVERETT CC	4465	18	0.0	0.0000374	0.0000374	100.0
FROM OUT OF STATE	TO					
SEATTLE CC	9271	13	0.0	0.0000270	0.0000270	100.0
FROM OUT OF STATE	TO					
SHORELINE CC	4302	21	0.0	0.0000436	0.0000436	100.0
FROM OUT OF STATE	TO					
BELLEVUE CC	2903	27	0.0	0.0000560	0.0000560	100.0
FROM OUT OF STATE	TO					
HIGHLINE CC	4560	414	0.0	0.0008593	0.0008593	100.0
FROM OUT OF STATE	TO					
GREEN RIVER CC	3908	10	0.0	0.0000208	0.0000208	100.0
FROM OUT OF STATE	TO					
FT. STEILACOOM	1593	8	0.0	0.0000166	0.0000166	100.0
FROM OUT OF STATE	TO					
CENTRALIA CC	1778	5	0.0	0.0000104	0.0000104	100.0
FROM OUT OF STATE	TO					
LOWER COLUMBIA	2177	4	0.0	0.0000083	0.0000083	100.0
FROM OUT OF STATE	TO					
CLARK CC	3908	50	0.0	0.0001038	0.0001038	100.0
FROM OUT OF STATE	TO					
WENATCHEE CC	1532	7	0.0	0.0000145	0.0000145	100.0
FROM OUT OF STATE	TO					
YAKIMA CC	3129	8	0.0	0.0000166	0.0000166	100.0
FROM OUT OF STATE	TO					
SPOKANE CC	5486	38	0.0	0.0000789	0.0000789	100.0
FROM OUT OF STATE	TO					
BIG BEND CC	1081	6	0.0	0.0000125	0.0000125	100.0
FROM OUT OF STATE	TO					
COLUMBIA BASIN	2847	9	0.0	0.0000187	0.0000187	100.0
FROM OUT OF STATE	TO					
WALLA WALLA CC	1040	28	0.0	0.0000581	0.0000581	100.0
FROM OUT OF STATE	TO					
TACOMA CC	3196	16	0.0	0.0000332	0.0000332	100.0
FROM OUT OF STATE	TO					
UNIV OF WASH FR	6554	144	0.0	0.0002989	0.0002989	100.0
UNIV OF WASH SO	5722	273	0.0	0.0005666	0.0005666	100.0
UNIV OF WASH JR	5425	184	0.0	0.0003819	0.0003819	100.0
UNIV OF WASH SR	5207	52	0.0	0.0001079	0.0001079	100.0

PRINT OPTIONS BY SCHOOL (SUMMARY/DETAIL REPORT)

ALL	SUMMARY	DETAIL	TOT. ENTR.	RET. TRANS.	EXITS CHE.	TOT. DIFF.	% DIFF.		TEMP/PER.	FIRST ?		RATE RPT

YEAR	B	E	SCH	H.S.	MIL	IN-ST	OUT-ST											
YEAR	C	E	SCH	HS-FR	MIL-FR	INST-FR	OUTST-FR	MIL-SO	INST-SO	OUT-SO	MIL-JR	INST-JR	OUTST-JR	MIL-SR	INST-SR	OUTST-SR		
YEAR	B	E	SCH	HS-FR	MIL-FR	INST-FR	OUTST-FR	MIL-SO	INST-SO	OUT-SO	MIL-JR	INST-JR	OUTST-JR	MIL-SR	INST-SR	OUTST-SR		
*	*	*	*	*	*	*	*											

YEAR	C	R	SCH	FR(BASE)	SO(BASE)	JR(BASE)	SR(BASE)	FR-FR	FR-SO	FR-JR	FR-SR	SO-SO	SO-JR	SO-SR	JR-JR	JR-SR	SR-SR	
YEAR	R	R	SCH					FR-FR	FR-SO	FR-JR	FR-SR	SO-SO	SO-JR	SO-SR	JR-JR	JR-SR	SR-SR	
*	*	*	*	*				*										

YEAR	C	T	"TO"	FR	SO	JR	SR	"FROM"										
YEAR	R	T	"TO"	FR	SO	JR	SR	"FROM"										
*	*	*	*	*				*										

YEAR	A	SCH	SPEC	GRAD	PROF	CHE ADDONS	CHE FR-RATIO	CHE SO-RATIO	CHE JR-RATIO	CHE SR-RATIO	RES FR-RATIO	RES SO-RATIO	RES JR-RATIO	RES SR-RATIO				

NOTES:

1. Print option card is required. Column 61 Blank = temporary run. Column 62 Blank = not first run. Column 64 Blank = no rate reports.
2. Blank field indicates no change or not required.
3. Add-ons not allowed for Community Colleges
4. Bases in retention card coded in 100's.

* Enter community college data in these fields.